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U. S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH ADMINISTRATION
BUREAU OF ANIMAL INDUSTRY
AND
COOPERATING SOUTHERN STATES

1950 Annual Report of S-10 IMPROVEMENT OF BEEF CATTLE FOR THE SOUTHERN REGION THROUGH BREEDING METHODS

January 1, 1951

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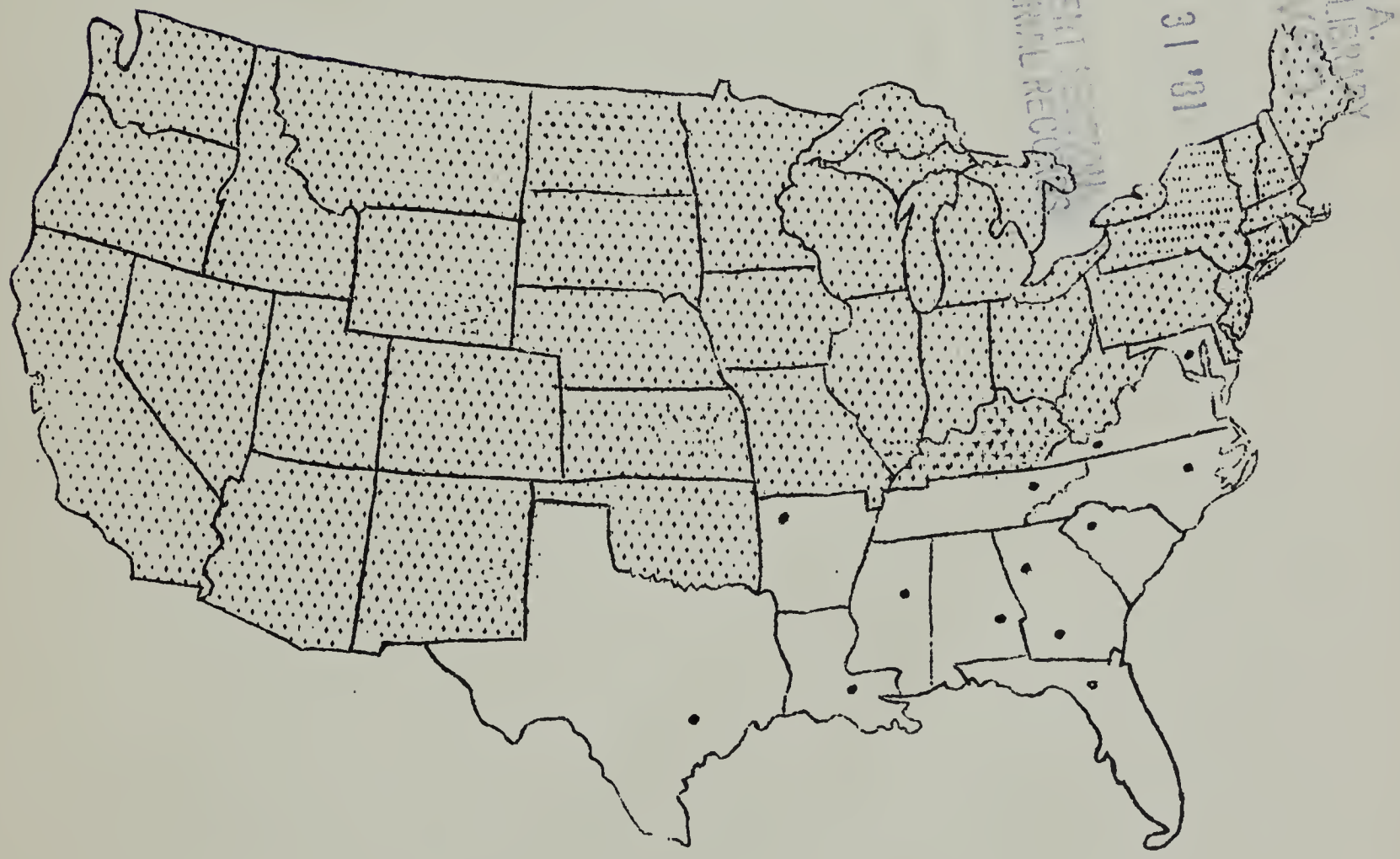

This is a report submitted by project leaders of Project S-10 "Improvement of Beef Cattle for the Southern Region Through Breeding Methods", and compiled by the Regional Coordinator. It is intended for use of administrative leaders and workers in developing the project, and is not for general publication.

C O N T E N T S

Page

Development of The S-10 Beef Cattle Breeding Research Program To Date - Everett J. Warwick 1

Comments by The Administrative Adviser - R. E. Patterson 7

Observations by The National Coordinator - R. T. Clark 8

Personnel 11

Active Projects Contributing to S-10 12

State Reports

Alabama 14

Arkansas 15

Florida 20

Georgia 23

Louisiana 27

Maryland 32

North Carolina 38

South Carolina 43

Tennessee 45

Texas 54

Virginia 62

DEVELOPMENT OF THE S-10 BEEF CATTLE BREEDING RESEARCH PROGRAM TO DATE.

Everett J. Warwick

P. L. 733, a law that has come to be known as the Research and Marketing Act, was passed by the 79th Congress of the United States and was signed by President Truman on August 14, 1946. This law provides for planned cooperative agricultural research by regions on problems of regional importance.

The importance of beef cattle in the Southern states is sometimes not recognized, but according to preliminary January 1, 1951 estimates the South Atlantic and South Central states together have 7,954,000, or 43.3%, of the 18,383,000 cows and heifers two years old and over kept for purposes other than milk in the United States. This region of the United States is beset with the problem of breeding cattle for adaptation to hot humid climates not found elsewhere in the United States. Recognizing the importance of the industry and the problems involved, the Directors of the Southern Agricultural Experiment Stations approved the establishment of this project.

Although several states had beef cattle breeding projects in progress prior to the activation of the regional project, coordinated effort did not begin until 1948.

Informal discussions regarding the possibility of developing a regional beef cattle project were held by personnel from the various states at the meeting of the Southern Agricultural Workers' Association in New Orleans, Louisiana, in February, 1947, and at the International Livestock Exposition in Chicago, Illinois, in December, 1947.

The first definite step toward developing the program occurred at the meeting of the Southern Agricultural Workers' Association in Washington, D. C., in February, 1948. At this time a committee composed of R. E. Patterson of Texas, J. E. Foster of Maryland, H. A. Stewart of North Carolina,

J. A. Whately, Jr., of Oklahoma, C. M. Kincaid of Virginia, C. S. Hobbs of Tennessee, R. T. Clark of the United States Department of Agriculture, Bureau of Animal Industry, and S. H. Work of the Office of Experiment Stations, drew up a tentative Southern Regional Beef Cattle Breeding Project. This project was submitted for approval to an informal committee of Southern states representatives and Station Directors. The committee approved the project and recommended it to the Southern Directors for their approval.

Assistant Director R. E. Patterson, representing Director Lewis of the Texas Station, and Vice Director F. S. Chance of the Tennessee Station presented this project to the Southern Regional Directors for their approval. It was tentatively approved by the Directors in lieu of a final draft for signatures, and the first meeting of the Technical Committee was called for March 1, 1948, at Knoxville, Tennessee. After some revision, the formal project entitled "Improvement of Beef Cattle for the Southern Region Through Breeding Methods" was approved by the Technical Committee members and sent by R. E. Patterson, Acting Administrative Adviser, to the various stations for approval.

After approval of the project by the various stations, it was signed on March 13, 1948, by R. A. McGinty for the Southern Directors, on March 13, 1948, by C. E. F. Guterman for the Committee of Nine, and on March 18, 1948, by R. W. Trullinger as Chief, Office of Experiment Stations.

A Memorandum of Understanding between the Southern Experiment Stations and the United States Department of Agriculture for carrying on cooperative work on the project was signed by the Directors of the Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Virginia stations and became effective when signed for the U. S. Department of Agriculture by B. T. Simms, Chief, Bureau of Animal Industry on September 15, 1948, by R. W. Trullinger, Chief, Office of Experiment Stations on September 13, 1948, and by B. T. Shaw, Acting Administrator, Agricultural Research Administration on September 16, 1948.

Dr. R. D. Lewis, Director of the Texas station, was named Regional Administrative Adviser by the Southern Directors during the formative period of the project and served in that capacity until May, 1950. In October, 1948, at the request of Dr. Lewis, Dr. R. E. Patterson of the Texas station was named Coadministrative Adviser. Dr. Patterson, Vice Director of the Texas Station, was appointed Regional Administrative Adviser by the Southern Directors in May, 1950.

Dr. R. T. Clark, National Coordinator of Beef Cattle Research for the Bureau of Animal Industry, has served as coordinator of the project from its inception. In April, 1950, Dr. Everett J. Warwick became Assistant Coordinator for the Southern project with offices at the University of Tennessee, Knoxville, Tennessee.

Officers of the Technical Committee to date have been:

Chairman:

Dr. Charles S. Hobbs	-	1948-1950
Dr. C. M. Kincaid	-	1951-

Secretary:

Dr. Warren Gifford	-	1948-1949
Dr. H. A. Stewart	-	1950-

Executive Committee Members: (in addition to officers and the Administrative Adviser)

Dr. C. M. Kincaid	-	1948-1949
Dr. B. L. Warwick	-	1950
Dr. Charles S. Hobbs	-	1951 -
Dr. R. T. Clark	-	1948-
Dr. E. J. Warwick	-	1950-

Objectives of S-10

As set forth in the project outline, the objectives of this research are:

1. To develop breeding methods, selection criteria, and procedures which will result in beef cattle capable of higher productive efficiency and superior market qualities of product.
2. To develop beef cattle with higher reproductive efficiency, greater longevity and other aspects of lifetime productive efficiency.
3. To develop beef cattle especially adapted to conditions in various environments of the Region.
4. To explore the usefulness of systems of breeding, as:
   (a) Inbreeding
   (b) Crossbreeding
   (c) Outbreeding
   (d) Combinations of these to accomplish objectives 1, 2, and 3.
5. To study productiveness of existing or introduced stocks of beef cattle.

Scope of The Work

The thirteen states previously mentioned signed the Memorandum of Understanding covering cooperative beef cattle breeding research with the United States Department of Agriculture in 1948, and by so doing indicated their intention of participating actively in the project. To date ten states (Arkansas, Florida, Georgia, Louisiana, Maryland, North Carolina, South Carolina, Tennessee, Texas, and Virginia) have developed active projects. The Alabama station has developed a project within the past six months and expects to be actively engaged in beef breeding work early in 1951.

Livestock, Facilities, and Equipment

At the present time six stations (Texas, Louisiana, Georgia, South Carolina, North Carolina, and Florida) are conducting studies on the usefulness of beef cattle breeds not of British origin, including the Brahman, Africander, and the Romo Sinuano. Seven stations (Arkansas, Georgia, Maryland, North Carolina, Tennessee, Virginia, and Texas) are working with one or more British breeds.

As of July 1, 1950, there were 1,063 purebred and 1,280 grade or crossbred cows and heifers of breeding age in the projects. Due to high prices of breeding stock and the failure of anticipated increments in RMA funds, the development of breeding herds has been slower than had been anticipated. No project is at present fully stocked. In order to increase numbers more rapidly than otherwise possible, the Texas and Virginia stations are utilizing cattle owned by cooperating breeders and made available to the stations on a loan or share arrangement.

Most stations in the region hold title to or have control of adequate land to permit the maintenance of greatly expanded breeding herds provided funds are available for pasture improvement programs and the acquisition of cattle. Most states are in need of improved facilities for feeding and evaluating cattle and for carrying on technical phases of the work such as heat tolerance tests and physiological measurements. Several stations have very excellent abattoirs for slaughter and carcass evaluation work, while other stations must solicit the cooperation of commercial packing firms for work of this kind.

The Texas station is carrying on an extensive program of bull testing at the Balmorhea Station and at the Bluebonnet Farm, McGregor, Texas, and the PanTech Farms, Amarillo, Texas. Bull and heifer calves owned by breeders and sent to the stations in sire progeny groups are fed out at the stations

under standardized conditions so that comparisons of growth rates are possible. Cooperating breeders pay a large share of the expenses of this program which, in the winter of 1950-51, includes 221 bulls and 68 heifers from a total of 39 cooperators.

Problems Needing Particular Attention

Generally, in the United States, the philosophy in past years has been to improve management and environmental conditions to fit the available animals rather than breeding for adaptability. Without depreciating the former procedure and without attempting to minimize the importance of effecting further improvements in environment where such are economically feasible, the fact remains that some areas not perfectly adapted to presently existing livestock types, and apparently not capable of much improvement, can add materially to our total beef supply. With an ever-increasing population, the effective utilization of such areas is imperative if our people are to maintain their present high meat diets.

The Southern Region of the United States presents beef cattle breeding problems not encountered elsewhere in this country. Much of the area has a hot humid climate where cattle of the British types are not well adapted. Brahma x British crossbreds have been shown to be superior to British types in many regrads, but do have serious shortcomings in temperament and, perhaps, in carcass quality. Granting that Brahma blood increases productivity in these areas, the question remains as to how it can best be used, i.e. (1) is a continual crossbreeding system necessary, or (2) can strains be developed which will breed true for the desirable qualities of the first crosses? Are there other breeds or types of cattle in the world as yet untried in these areas which would be better adapted?

The effort of the North Carolina station to find and propagate cattle capable of survival and production on the reed ranges of the Atlantic coastal area (14,000,000 acres in North Carolina alone) is a noteworthy attempt to

breed animals for adaptation to a rigorous environment.

Beef cattle production in the whole of the Southern Region, including the hot humid coastal areas and the more temperate upland, must necessarily be based primarily upon the utilization of roughage. With the long (in some cases year round) grazing seasons typical of the area, the problem of efficient pasture utilization is paramount.

From a breeding standpoint the problems facing us seem to be those of (1) developing selection criteria which will reflect true economic value for the region, (2) evaluation of various stocks for adaptation, (3) evaluation of diverse breeding systems for their potential value in increasing the average productivity of beef cattle, and (4) developing breeding procedures which will give uniform and predictable results.

The above problems involve the development of record systems and the evaluation of management systems for their ability to permit the identification of animals carrying potentially valuable germ plasm at as young ages as possible.

COMMENTS BY THE ADMINISTRATIVE ADVISER

R. E. Patterson

Beef cattle production in the South provides considerable farm cash income. Its relative importance to total agriculture in these states is steadily increasing. The possibilities of improved beef production are almost unlimited in view of the part livestock play in soil improvement and soil conservation, and in a better balanced farming enterprise. The South has many different climatic conditions and soil types which, in many cases, require the development of types of beef cattle with specific adaptations to the environmental conditions. It cannot be expected, therefore, that a single breeding system can be evolved that will satisfy the requirements of an improvement program for all of the conditions existing in the region.

Within the availability of facilities and financial support, the research workers are meeting the challenge of improving Southern beef cattle. The objectives and procedures of the S-10 Cooperative Southern Regional Beef Cattle Breeding project offer great possibilities for advancement. The problems faced are complex and difficult, and it is only through harmonious and coordinated efforts of the animal breeders and geneticists that we can expect real progress in uncovering principles and developing methods that can be used in producing beef more abundantly and more efficiently, and of better quality.

Significant progress has already been made in the S-10 Regional program. Through the isolation and evaluation of important economic characteristics of beef cattle, more effective improvement programs are being developed. Continued progress is being made in the development of sound research programs within the states and a well-balanced, closely coordinated regional project.

OBSERVATIONS BY THE NATIONAL COORDINATOR

R. T. Clark

In reviewing the work that has gone into S-10 since its inception, we are impressed by the scope of the project plans that have been offered by cooperating stations. This should clearly indicate to anyone reviewing the program of work that the Southern Region embraces an area which includes a wide variety of environments. It should also be remembered that since the North Eastern Region is not yet organized to do work with beef cattle certain border states have elected to join the Southern Region so that we now have project work under S-10 at as widely separated points as College Park, Maryland, PanTech Farms, Amarillo, Texas, and Ona, Florida.

Most of the people with whom we work are agreed that it would be unwise from many standpoints to center the work at one or just a few locations. Therefore, our program has been organized on a decentralized basis with each participating State offering its resources and the Bureau doing likewise.

As cooperators in such an effort, you should appreciate the responsibilities of your team leader, Dr. Everett Warwick, for he serves the entire region as represented by the S-10 Committee. Also as the Bureau's representative he is now being called upon to assist in the entire beef cattle work program of the Bureau. At the moment with certain travel ceilings imposed upon our Bureau during the current national situation it has been difficult for all of us to operate a decentralized program, therefore, we will all have to pitch in and do what we can to keep our program on a healthy and truly cooperative basis.

We believe that a very good start has been made. Several Southern Station Directors have expressed this view to me within recent weeks. They are becoming appreciative of the importance of livestock, and especially beef cattle, within the Region. Some of the recent additions to the physical plant and facilities of some of the Southern Stations are of considerable significance and indicate the trend. I have in mind especially the Ames Plantation (University of Tennessee), the Bluebonnet Farm at McGregor (Texas A. & M.), the PanTech Farms at Amarillo (Texas Tech), and the large addition to the land facilities of the University of Arkansas. There are a number of others of considerable importance to the Region.

The large increase in testing facilities within the Southern Region, and particularly in Texas, will very soon influence research and industry. But above all, we want to continue to build a useful and sound research program of real significance to the Region so its influence will be felt long after we are gone. Therefore, it behoves us to leave a good record.

Even at this early stage, we are being called upon to work with industry. Let us capitalize on that by integrating our efforts with the Extension Services wherever we can for they are and will be increasingly involved in the application of our results.

We are only a small team so far, but already there is stirring throughout the industry a very real and alert interest in what we are doing. That is a good omen.

PERSONNEL of the S-10 Project

STATE AGRICULTURAL EXPERIMENT STATION WORKERS

Alabama	*W. D. Salmon, Keith E. Gregory	Auburn, Ala.
Arkansas	*Warren Gifford, C. J. Brown, Maurice Ray	Fayetteville, Ark.
Florida	*W. G. Kirk	Ona, Fla.
Georgia	*B. L. Southwell	Tifton, Ga.
	Walter Neville	Experiment, Ga.
Louisiana	*James F. Kidwell, S. E. McCraine	Baton Rouge, La.
Maryland	*J. E. Foster, W. W. Green	College Park, Md.
Mississippi	*H. H. Leveck	State College, Miss.
North Carolina	*H. A. Stewart, E. U. Dillard	Raleigh, N. C.
South Carolina	*E. G. Godbey	Clemson, S. C.
Tennessee	*Charles S. Hobbs, Harold J. Smith, R. P. Moorman	Knoxville, Tenn.
Texas	*Bruce L. Warwick	McGregor, Texas
	R. E. Patterson, R. W. Colby	College Station, Texas
	J. J. Bayles	Balmorhea, Texas
	L. A. Maddox, Jr.	Panhandle, Texas
Virginia	*C. M. Kincaid, R. E. Carter	Blacksburg, Va.
	B. M. Priode	Front Royal, Va.

BUREAU OF ANIMAL INDUSTRY WORKERS

R. T. Clark, Nat'l Coordinator, Beef Cattle Research, Denver, Colo.

Everett J. Warwick, Regional Coordinator, S-10, Knoxville, Tenn.

A. L. Baker, Supt., Beef Cattle Research Station, Front Royal, Va.

E. H. Vernon, Supt., Iberia Livestock Experiment Farm, Jeanerette, La.

William Jackson, Supt., Chinsegut Hill Sanctuary, Brooksville, Fla.

REGIONAL OFFICERS

R. E. Patterson, Administrative Adviser	College Station, Texas
C. M. Kincaid, Chairman	Blacksburg, Va.
H. A. Stewart, Secretary	Raleigh, N. C.
Charles S. Hobbs, Executive Committee Member	Knoxville, Tenn.

* Technical Committee Member.

STATE PROJECTS CONTRIBUTING TO S-10

Station	Project
Alabama	(Ala. 525) The Improvement of the Beef Cattle of Alabama Through Breeding Methods.
Arkansas	(B. J. 170) The Determination of Adequate Record of Performance Tests for Beef Cattle.
Florida	(State 390) Breeding Beef Cattle for Adaptation to Florida.
Georgia	(State --) The Improvement of Beef Cattle in Georgia Through the Use of Selection for Economic Factors Brought Out in the Process of Inbreeding, Crossbreeding, and Outbreeding.
Louisiana	(R. M. 605) Crossbred and High Grade Cattle for Gulf Coast Conditions.
Maryland	(R. M. C-14) A Study of the Productivity of Purebred Beef Cattle in Maryland.
	(R. M. C-14-a) Effect of Early Weaning on the Duration of Material Influences in Beef Calves.
	(R. M. C-14-b) Type Classification As An Aid in Selection of Beef Breeding.
	(R. M. C-14-c) Studies on Bodily Conformation and the Correlations Between Live-Animal Measurements and the Weight and Other Characteristics of Carcasses and Wholesale Cuts in Beef Animals.
Mississippi	No Active Project.
North Carolina	(State 74-ai-28) The Improvement of Beef Cattle Through Breeding Methods.
	(State 46-ai-17) The Development of Beef Cattle Especially Adapted to the Coastal Plains Region of North Carolina and Similar Areas.
South Carolina	(R. M. 25) The Use of Brahman and Certain British Breeds of Beef Cattle in the Production of Fat Calves.
Tennessee	(R. M. 15) The Improvement of the Producing Ability of Beef Cattle.

State Projects Contributing to S-10 (continued)

Station	Project
Texas	(R. M. 607) Improvement of Beef Cattle Through Selection of Performance-Tested and Progeny-Tested Sires.
	(R. M. 650) Improvement of Beef Cattle Within Pure Breeds and Certain of Their Crosses Through Breeding Methods, Based on Evaluation Tests for Efficiency and Rate of Gain, Heat Tolerance and Carcass Value.
	(R. M. 714) Methods for Measuring Potential Efficiency of Feed Utilization in Immature Cattle.
Virginia	(R. M. 9271) The Improvement of Beef Cattle for Virginia Through Breeding Methods.

ALABAMA STATION

Submitted by W. D. Salmon, Dec. 1950

1. Project Title: The Improvement of the Beef Cattle of Alabama Through Breeding Methods.

2. Objectives:

(a) To investigate principles of breeding beef cattle that can be used in the production of milk-fat calves on Alabama farms.

(b) To determine how rapidly the performance of the native cattle of this area can be improved by the use of a purebred sire program.

(c) To determine the amount of improvement in performance that can be made in established beef breeds by selection with attention given only to performance characters.

(d) To study the importance of heterosis in a grading-up program in the production of milk-fed calves.

3. Accomplishments during year:

(a) Personnel: Dr. K. E. Gregory has been employed as senior leader on this project and will report for duty as soon as his Ph.D. degree work is completed, probably about April 1, 1951.

(b) Facilities and cattle acquired: A tract of 975 acres of land has been acquired at the Main Station at Auburn for use in this project. A first-class fence has been built around the outside boundary of this. A Farmall M and a Farmall H tractor, a 2-ton truck, a tractor plow, disk harrow, section harrow, Brillion seeder, and a Rome land-breaking disk have been purchased. One hundred and fifty acres have been cleared, prepared and seeded to pasture crops this fall. A manager's cottage and a combination machinery shed and storage barn have been built. A dam has been constructed to provide water storage.

The purebred Hereford and Angus heifers needed for the experiment have been obtained. The dry weather in the fall and the abnormally low temperature since late November have so retarded the growth of the pasture that it has not been feasible to accumulate the native heifers yet. We hope this will be possible at least by April 1.

ARKANSAS STATION

Submitted by Warren Gifford and C. J. Brown, Dec. 12, 1950

Introduction

As an introduction to the following report, we wish to call attention to the following items which should help in clarifying the material presented.

All animals in the Arkansas project are purebred, and are managed as purebred cattle. At the Main Experiment Station, Angus, Hereford, and Shorthorn cattle are managed as a single herd. At the Livestock and Forestry Station, a purebred herd of Angus is maintained.

Hand mating is practiced, and calves are dropped in all months of the year with only a few being dropped in the summer months. All calves are weaned at eight months of age. All bull calves and steer calves not used in progeny feeding trials are sold at weaning or shortly thereafter. Female replacement stock after weaning are pastured or group fed to make acceptable growth. These heifer groups are made up according to age without regard to sire or breed. Prior to July, 1950, individual feed and pasture records for all animals are not available; therefore, they are omitted from this report in the section on post weaning performance.

1. Project Title: The Determination of Adequate Records of Performance Tests for Beef Cattle.

2. Objectives:

To develop practical but adequate methods for evaluating the breeding worth of beef sires and dams which would include the following:

(a) A system of measuring variations in young animals and the values of such measures in predicting variations in the same animals at more mature ages.

(b) Methods for measuring and evaluating the records of performance of brood cows.

(c) The determination of the kind of records and number of progeny necessary to prove beef sires.

3. Accomplishments during year:

(a) During the year from November 1, 1949 to November 1, 1950, the following cattle and facilities have been acquired for use in the Arkansas beef cattle breeding project:

One Shorthorn bull was purchased for use as a herd sire on the Shorthorn cows at the Main Experiment Station. Four bred heifers were purchased and added to the Hereford herd at the Main Station. Twelve Hereford, one Shorthorn, and twenty-five Angus heifers were added to the herds from young heifers grown out as replacements.

At the Main Experiment Station, equipment (milker, scales, and material for chute) has been purchased and is being installed to continue the study of milk production in beef cattle.

At the Livestock and Forestry Station, new and much enlarged beef cattle area and pastures have been established. A new barn and hay storage has been completed at a cost of $5,200, and is in use.

(b) The following research has been completed or is in progress: Individual feeding of bull progeny from two sires (1 Angus and 1 Hereford) has been completed. At present, individual feeding of three sire groups of bull progeny and one of steer progeny is in progress.

Subjective evaluation studies of all animals in the herds were continued.

Growth and developmental changes in both young and mature animals, as indicated in weights and measurements, were recorded.

(c) Summary of analysis of scoring data: Subjective conformation scores of individual Hereford cows as given by four judges were analyzed to determine the agreement between judges, the repeatability of a judge on the same cow at different scoring dates, and to study the variation in scores of seven items of conformation. These seven items of conformation were breed type, general appearance, head and neck, forequarters, body, hindquarters, and overall rating. Judges were able to agree more closely for items on which they must consider the entire animal. Judges were best able to recognize differences in overall rating and least able to recognize differences in forequarters. The correlation between repeated scores of the same cow by the same judge was generally between .4 and .5.

Although significant differences in judges' scores existed, they were of minor importance in determining the total variance in conformation scores. Other sources of variation which proved to be of minor importance were the interaction between judges and cows, and the interaction between judges and seasons. Cow differences were by far the greatest source of variation in conformation scores and accounted for roughly 50 per cent of the total variation. Seasonal differences in scoring level and the interatcion between cows and season were important sources of variation and contributed roughly 5 to 10 and 15 to 20 per cent, respectively, to the total variation in scores.

Effect of Age on Scores of Cows

In the previous analysis, the interaction between cows and season was shown to be one of the major sources of variation in cattle scores. Differences in the total score which individual cows received on the different classification dates would be expressed by this interaction. One of the influences which might increase the magnitute of this interaction would be age of the cow. To study the influence of age on overall score, the 70 cows, which had remained in the herd until they were at least $3\frac{1}{2}$ years old, were grouped according to age as follows: $3\frac{1}{2}$-5, $5\frac{1}{2}$-7, $7\frac{1}{2}$-9, $9\frac{1}{2}$-11. Analysis of variance revealed that the

were highly significant differences between these age groups as well as between the scores of the cows within these groups at different ages.

On the basis of these 726 classifications of 70 cows, it appears that there is a downward trend in the scores until roughly the age of the first calving, at which time the trend is reversed and the scores tend to increase up to the age of about 5½ years which would roughly correspond to maturity. After maturity, the scores seem to remain rather constant until changes associated with senility begin to cause a decline. The correlation between age of scoring and the average lifetime score, based on at least 7 scores, was highest at 3 years (.81), and 1½ years (.80).

4. Future plans:

Continuation of studies of milk production in beef cattle.

Continuation of the growth and development studies on both young and mature cattle.

Continuation of subjective evaluation studies.

Continuation of individual feeding of bull progeny of sires with the feeding of steer and heifer groups when possible.

Continuation of the long time program of developing lines within the herds.

5. Publications:

A Subjective Method of Evaluating Breeding Animals in Beef Herds - A Classification System. Jour. An. Sci. 8:608.

Importance of High Milk Production in Beef Cows Found Over Estimated. Jour. An. Sci. 8:605-606.

A Study of Classification Scores of Hereford Cows. Submitted to Jour. An. Sci.

6. Publications planned:

Station Bulletin on subjective evaluation.

Journal paper or Station Bulletin on milk production.

POSTWEANING PERFORMANCE OF 1949 CALVES FULL FED AFTER WEANING
(or pastured for high gains)

Arkansas Agricultural Experiment Station
(Main)
(University of Arkansas)

Line or group designation	Sire A1	Sire A2	Sire A3	Sire H1
Location	Main Sta.	Main Sta.	Main Sta.	Main Sta.
Breeding of calves	Angus	Angus	Angus	Hereford
Av. inbreeding (%)	0	3.6	2.2	0
Bulls				
No.	0	5	9	5
Av. weaning wt.		546.2	602	637.4
Av. 12 month wt.		729.8	737	801.4
Length of feeding period		154		154
Av. da. gain on feed		1.51		1.58
Feed per cwt. gain (lbs.)		1000.2		966.1
Concentrates		524.1		511.6
Roughage		476.0		454.4
Av. type score (12 mos.)		63.6	71	64.4
Steers				
No.	4	3	7	
Av. weaning wt.	512	516	496	
Heifers				
No.	4	7	7	6
Av. weaning wt.	501	536	476	649.0
Av. 12 month wt.	620	640	616	638.2
Av. type score (12 mos.)	68	67	72	66.2

PERFORMANCE OF COW HERDS. 1950 CALVES

Arkansas Agricultural Experiment Station

L & F indicates Livestock and Forestly Station, Batesville.
M. Sta. indicates Main Station, Fayetteville.

Line or group designation	A7	A8	Sire A4	Sire A5	Sire A6	Sire S2	Sire H1	Sire H2	Sire H3
Location	L & F	L & F	M. Sta.	M. Sta.	M. Sta.	M. Sta.	M. Sta.	M. Sta.	M. Sta.
Breed of sire	Angus	Angus	Angus	Angus	Angus	Short H.	Here.	Here.	Here.
Breed of dam	Angus	Angus	Angus	Angus	Angus	Short H.	Here.	Here.	Here.
No. cows bred	7	21	23	11	10	6	11	11	19
No. cows calving	7	21	23	10	10	6	11	11	19
No. calves raised	7	21	22	9	10	6	10	11	18
Av. inbr. dams (%)	0	0	1.0	0	1.4	0	0	0	0
Av. inbr. of calves (%)	0	0	2.0	1.0	1.4	0	11.0	0	0
Av. birth wt. (lbs.)	56	62	65	66	68	63	63.5	81.3**	62.9***
Av. birth date	1/3/50	6/23/50	5/14/50	5/10/50	9/11/50	9/24/50	9/25/49	3/18/50	9/13/50
Were calves creep fed?	yes	yes	yes	yes	yes	yes	yes	yes	yes
Av. wt. at 6 mo. (lbs.)	327	377(6)*	421(17)	329(4)	none weaned	none weaned	344.6	451.8	none weaned
Av. weaning date	9/6/50		1/14/51	1/10/51			5/25/50	11/18/50	
Av. wean. type score	66.9		64	70			65.6	67.6	
Av. wean. condition score	65.0		66	68			66.1	68.1	

* Numbers in parenthesis indicate number of calf weights averaged. These are calves old enough to wean when this report was made in December, 1950.
** All calves from mature cows.
*** All calves from first calf heifers.

FLORIDA STATION

Submitted by W. G. Kirk, Dec. 14, 1950

From Range Cattle Experiment Station, Ona, Florida

1. Project Title: Breeding Beef Cattle for Adaptation to Florida.

2. Objective:

To determine the value of different crosses and strains of cattle for foundation animals and commercial beef production.

3. Accomplishments during year:

(a) No new animals were acquired during the year. The natural increase will provide additional animals for future use. The cattle of breeding age available for this project include:

29	purebred Brahman cows and heifers
20	crossbred, Shorthorn x Brahman, cows and heifers
1	3/4 Brahman x 1/4 Shorthorn
200	grade cows and heifers
3	crossbred, Shorthorn x Brahman, bulls
3	purebred Brahman bulls
2	purebred Shorthorn bulls

(b) During 1950, weight records have been obtained at 28-day intervals of all animals in the breeding herd, and birth weights of all calves have been recorded. Calves were graded at weaning, when approximately 7 months of age.

Slaughter data have been obtained on all steers from the experimental pastures and fattened in dry lot.

Rib roasts, 9-10-11 ribs, from crossbred steers (Shorthorn x Brahman) have been used for physical separation, chemical analysis, cooking and tenderness studies.

4. Future plans:

Scoring of all cattle used on this project at stated intervals. The mature cows will be graded in January, 1951.

Records of performance testing of bulls by feeding calves a standard ration.

Line breeding of purebred Brahmans.

5. Publications: No publications in 1950.

6. Publications planned:

Meat studies of cattle fattened in dry lot.

Weight changes of cattle in central Florida.

PRODUCTION AND SLAUGHTER DATA ON YEARLING CATTLE
NOT INCLUDED IN BREEDING HERDS in 1950.

Range Cattle Experiment, Ona, Florida.

Line or group designation	No. 1	Animals slaughtered	1 steer - off grass.
Breeding	Crossbred (Sh x Br)	Av. age at slaugh.	695 days
Sex	Steers	Av. slaugh. wt.	820 lbs.
No.	11	Av. slaugh. grade	Comm.
Av. age (fall 1949)	228 days	Av. dressing %	53.0
Av. wt. (fall 1949)	468 lbs.	Av. carcass grade	Comm.
Av. winter gain 165 da.	112 lbs.		
Av. spring gain 57 da.	68 lbs.		
Days on pasture- not fed	85		
Av. gain on pasture	91		
Av. wt. 18 mo. of age	770 lbs.		

Pastures developed slowly because of extremely dry conditions during spring 1950.

PERFORMANCE OF COW HERDS. 1950 CALVES
(partially improved pasture)

Herd No.	1	2	3	4
Line or group designation	Crossbreds (Sh x Brah)	3/4B 1/4Sh	3/4Sh 1/4B	Grade Herd
Breed of sire	Polled Short H.	Brahman	Polled Short H.	Brahman (Smoky)
Breed of dam	Brahman	Crossbreds (Sh x Br)	Crossbreds (Sh x Br)	Grade**
No. cows bred(pasture br.)	17	10	2	55
No. cows calving	16	10	2	43
No. calves raised	15	10	2	43
Av. birth wt. (lbs.)	67	71	63	68
Av. birth date	3/10/50	3/8/50	3/29/50	2/21/50
Were calves creep fed?	yes	no	yes	no
Av. wt. at 6 mo.(lbs.)	446	416	450	410
Av. wean. date	9/26/50	9/25/50	10/3/50	9/20/50
Av. wean. type score	10	10	10	10
Av. wean. condition score	11	10	9	10

** Grade Brahman, Shorthorn and Devon cows.

PERFORMANCE OF COW HERDS. 1950 CALVES, Ona, Florida.

Herd No. *	5	6	7	8
Line or group designation	Grade Herd	Grade Herd	Grade Herd	Grade Herd
Breed of sire	Brahman(Emp)	Brahman (Floppy)	Brahman (David)	Crossbred (Sh x Br)
Breed of dam	Grade**	Grade***	Grade**	Grade**
No. cows bred(pasture bred)	53	19	36	24
No. cows calving	44	14	31	13
No. calves raised	44	14	31	13
Av. birth wt. (lbs.)	71	75	72	66
Av. birth date	2/21/50	3/9/50	3/22/50	3/25/50
Were calves creep fed?	no	no	no	no
Av. wt. at 6 mo. (lbs.)	393	409	410	381
Av. wean. date	9/22/50	10/1/50	9/27/50	9/22/50
Av. wean. type score	10	9	10	9
Av. wean. condition score	11	9	9	8
Calves slaughtered at weaning ****				
1. Steer or bull calves				
No.	4	2	-	1
Av. age (days)	197	192	-	199
Av. wt. (lbs.)	394	405	-	470
Av. slau. grade	Comm. +	G -	-	G -
Av. dress. % shrunk	58.23	55.51	-	57.17
Av. carcass grade	Comm.	C +	-	G
2. Heifer calves				
No.	-	1	2	-
Av. age (days)	-	196	190	-
Av. wt. (lbs.)	-	375	430	-
Av. slau. grade	-	Comm. +	G -	-
Av. dressing %	-	55.54	57.05	-
Av. carcass grade	-	Comm. +	G -	-

* Herds No. 5 and 6 were on partially improved pasture. Herds 7 and 8 were on unimproved pasture.

** Grade Brahman, Shorthorn, Hereford, and Devon cows.

*** Grade Brahman cows.

**** Calves culled from herd for different reasons.

Type and condition scores in the Florida report are according to a system in which 10 signifies "good", 9 "low good", and 11 "high good".

GEORGIA STATION

Submitted by B. L. Southwell, Dec. 11, 195[illegible]

1. Project Title: The Improvement of Beef Cattle in Georgia Through the Use of Selection for Economic Factors Brought Out in the Process of Inbreeding, Crossbreeding, and Outbreeding.

2. Objectives:

   (a) Sire testing studies with Polled Hereford and Angus cattle.

   (b) The value of the Brahman breed in developing cattle that are better adapted to the climatic and feed conditions of the Coastal Plains area of the Southeast.

3. Accomplishments during year:

   (a) No new cattle have been acquired for the cooperative breeding projects other than the herd increases. Approximately fifty head of purebred Polled Hereford breeding cows are involved in the test. Additions are being made to the herd from the female off-spring. Most of the off-spring will be used as replacements rather than to increase the size of the herd.

   No additions have been made to the grade Hereford herd of 38 animals being used in the Brahman versus Angus breeding studies. The crossbred females will be retained for further breeding studies.

   No new equipment has been added during the year other than small items that were needed for immediate use.

   (b) Polled Hereford sire testing studies: Two bulls proved during the fall and winter 1949-50. All of the off-spring, both bulls and heifers, were fed in dry lot for 140 days after weaning. Each off-spring received a rating based on the following formula:

$$\text{Rating} = \text{Type Score} + \frac{\text{Av. Daily Gain}}{.05}$$

   Each sire received a rating equal to the average of all of his off-spring. The two Polled Hereford sires received ratings of 82.25 and 82.97, respectively. The highest top rating son of each bull was retained for the spring 1950 breeding season. These two high testing bulls had individual ratings of 101.80 and 98.80, respectively. These two bulls will be proved during the fall and winter of 1951-52.

   Two other Polled Hereford bulls had calf crops dropped in February and March of 1950. The off-spring of these two bulls are now being fed for 140 days, and will be proved at the end of the feeding test (early March, 1951.)

(c) Crossbreeding studies - First-cross Brahman versus First-cross Angus calves: Comparable groups of grade Hereford heifers dropped first-cross Brahman and first-cross Angus calves during February, March, and April, 1950. These calves were carried under comparable conditions during the suckling period. They were creep-fed a grain mixture composed of the following:

12 parts cracked shelled corn
1 part cottonseed meal (36% protein)
1 part peanut oil meal (45% protein).

The steer calves were slaughtered September 25, when the first-cross Brahman calves were 214 days of age and the first-cross Angus calves were 225 days of age. Birth weights and slaughter data are attached.

4. Future plans:

The inbreeding of the Polled Hereford herd will be held at a minimum. In general, the highest rating off-spring of the best proved bull will be selected for testing. From time to time good prospective herd sires will be purchased and tested.

The grade Hereford cows have been rebred; one-half to a purebred Brahman and the other half to a purebred Angus bull for a 1951 calf crop. This will be repeated for a 1952 calf crop.

The first-cross Brahman and first-cross Angus heifers (1950 calf crop) are now being full-fed in dry lot. Both groups of crossbred heifers will be bred to a Polled Hereford bull. It is not yet determined whether they will be bred to drop their first calves as 2-year or 3-year old heifers. Their breeding performance will be studied.

5. Publications:

No publications have been made concerning this work to date. As soon as enough data are accumulated, the results will be published.

POSTWEANING PERFORMANCE OF 1949 CALVES FULL FED AFTER WEANING

Georgia Coastal Plains Experiment Station.

Line or group designation	Sire Testing	Sire Testing	Crossbred
Location	Tifton	Tifton	Tifton
Breeding of calves	Purebred Polled Here.	Purebred Angus	Brahman x Hereford
Bulls			
No.	21	5	
Av. wean. wt.	488	486(193 da. of age)	
Av. 12 mo. wt.	861	863	
Length of feed. period*	140 da.	140 da.	
Av. daily gain	2.52	2.25	
Av. type score(12 mo.)	82.50	82.78	
Steers			
No.			5
Av. wt. 10/19/49			314
Days on feed*			140
Av. daily gain on feed			2.08
Av. slaugh. grade 3/8/50			L G
Heifers			
No.	12	9	
Av. weaning wt.	436.54	405.00 (186 da. of age)	
Av. 12 mo. wt.	722.80	722.31	
Length of feed. period	140 da.	140 da.	
Av. daily gain	2.10	1.79	
Av. type score(12 mo.)	82.50	84.18	

* Full fed Coastal Bermuda Hay and the following grain mixture:

Cracked shelled corn	600
Cottonseed meal	50
Peanut meal	50
Alfalfa leaf meal	14

PERFORMANCE OF COW HERDS. 1950 CALVES

Georgia Coastal Plains Experiment Station

Line or group designation	Sire Testing	Sire Testing	Crossbreed.	Crossbreed.
Location	Tifton	Tifton	Tifton	Tifton
Breed of sire	Polled Here.	Angus	Brahman	Angus
Breed of dam	Polled Here.	Angus	Gr. Here.	Gr. Here.
No. cows bred	41	17	19	19
No. cows calving	39	13	17	18
No. calves raised	39	13	15	16
Av. birth wt. (lbs.)	72	67	74	65
Av. birth date	Feb. 10	Feb. 26	Feb. 21	Feb. 13
Were calves creep fed?	yes	yes	yes	yes
Av. wt. at 6 mo. (lbs.)	376	428	387	384
Weaning date	Sept. 14	Sept. 14	Sept. 25	Sept. 25
Av. wean. wt. (lbs.)	439	473	474	470
Av. wean. type score			Good +	Good +
Av. wean. condition score	Good +	Good +	Good +	Good +
Calves slaughtered at weaning:				
Steers:				
No.			9	10
Av. age			214 days	225 days
Av. wt.			476.67	504.00
Av. slaughter garde			Good	Good
Av. dressing percent			60.14	58.51
Av. carcass grade			Good +	Good +

LOUISIANA STATION

Submitted by James F. Kidwell, December 14, 1950

1. Project Title: Crossbred and High Grade Cattle for Gulf Coast Conditions.

2. Objectives:

As originally outlined, the purposes of these investigations were (1) to develop types of beef cattle best suited to conditions along the Gulf Coast and (2) to determine the efficiency with respect to rates of growth on pasture, fattening ability, and meat quality of steers of various grades and crosses of beef cattle for economical beef production under Louisiana conditions. It is hoped that these objectives can be revised and broadened, as discussed under future plans.

3. Accomplishments during year:

(a) Facilities and cattle acquired: The project is being conducted at four different locations in Louisiana. These include the Louisiana Agricultural Experiment Station at Baton Rouge, the North Louisiana Experiment Station at Calhoun, the North Louisiana Hill Farm Experiment Station at Homer, and the U. S. D. A. Iberia Live-stock Experiment Farm at Jeanerette. During the coming year, it is planned to expand activities to include work at Red River Valley Experiment Station at Bossier City, and Northeast Louisiana Experiment Station at St. Joseph.

Louisiana Agricultural Experiment Station - Baton Rouge, La.

A pasture area of 300 acres has been subdivided into six breeding pastures of 50 acres each. These are to be used primarily as breeding and calving pasture. The cows are run together as much as possible. Bulls and cows were allotted to each pasture for the 1950 breeding season as follows:

Lot 1. Bull: 3/8 Africander-5/8 Aberdeen-Angus

Cows: 11 3/8 Africander-5/8 Aberdeen-Angus
8 1/4 Brahman-3/4 Hereford
19 cows

Lot 2. Bull: Brahman

Cows: 11 1/2Brahman-1/2 Hereford
8 1/4 Brahman-3/4 Hereford
5 1/2 Brahman-1/2 Angus
1 Purebred Brahman
25 cows

Lot 3. Bull: Charbray (1/4 Brahman-3/4 Charollais)

Cows: 8 1/4 Brahman-3/4 Hereford
8 High grade Herefords (4 to 5 crosses)
8 High grade Aberdeen-Angus (4 to 5 crosses)
7 Angus x Herefords (grades)
31 cows

Lot 4. Bull: Aberdeen-Angus

Cows: 11 High Grade Angus
8 1/4 Brahman-3/4 Hereford
10 High grade Herefords
29 cows

Lot 5. Bull: Shorthorn

Cows: 9 1/4 Brahman-3/4 Hereford
18 High grade Herefords
27 cows

Lot 6. Bull: Hereford

Cows: 10 High grade Herefords
9 1/4 Brahman-3/4 Hereford
3 3/4 Brahman-1/4 Hereford
8 High grade Angus
30 cows

About half the cows were bred for fall calves in 1950, so that only a partial calf crop will be obtained in the spring of 1951. However, the entire cow herd will fall into a regular breeding schedule in 1951. Allotting of bulls and cows will likely be altered in 1951.

During the past few months, teaching and research have been effectively combined at this station. This will provide a stronger integrated and balanced organization. It also means that the purebred Hereford, Angus, Shorthorn, and Brahman herds of the University will be available at least to a limited extent for research purposes. These herds have been developed primarily for teaching and demonstration and to provide a show herd. Therefore, they are not handled as commercial cattle and are of limited value for breeding research. However, they can serve as a source of bulls and perhaps at times in other ways.

Physical facilities at Baton Rouge include a 20' x 60' concrete floored steel shed and Howe scales (6-ton capacity) located at the breeding pastures. There are facilities for feeding 30 to 40 steers in 4 lots. At present, individual feeding is not possible. There are also available 8 lots of 6 acres each. These lots are used primarily for pasture improvement work, but serve also for growing out animals on the breeding experiment. These lots open into a common alley;

adjacent to the alley are corrals, holding pens, a Fairbanks Stock scale (5-ton capacity), and a small storage shed. A considerable amount of additional pasture land is available.

There is also available for use in this project a complete slaughter house and meats laboratory. Carcass quality studies form an integral part of the project.

Early in October, 32 crossbred Africander-Angus or Brahman-Angus steers were obtained from the Iberia Livestock Experiment Farm. They were allotted among 4 groups as follows with respect to rations and breeding:

Lot I

Corn	79
Cottonseed Meal	21

% Brahman or Africander	No.	Sire
3/8 Africander	5	84-H_4
1/2 Africander	20	151-H_{21}
1/4 Brahman	31	278-G_{44}
5/16 Brahman	28	278-G_{44}
3/8 Brahman	3	256-G_{33}
3/8 Brahman	6	331-G_2
3/8 Brahman	24	341-G_3
1/2 Brahman	22	51-G_1

Lot II

Corn	46
Cottonseed Meal	23
Molasses	31

% Brahman or Africander	No.	Sire
3/8 Africander	16	84-H_4
1/4 Brahman	14	278-G_{44}
5/16 Brahman	34	341-G_3
3/8 Brahman	25	256-G_{33}
3/8 Brahman	8	256-G_{33}
3/8 Brahman	18	347-A_2
7/16 Brahman	21	331-G_2
1/2 Brahman	11	51-G_1

Lot III

Corn	55
Cottonseed Meal	5
Urea in Molasses	40
(8# urea, 92# molasses)	

% Brahman or Africander	No.	Sire
3/8 Africander	29	84-H_4
7/16 Africander	23	151-H_{21}
1/4 Brahman	7	278-G_{44}
5/16 Brahman	19	341-G_3
3/8 Brahman	32	51-G_1
3/8 Brahman	26	256-G_{33}
3/8 Brahman	17	256-G_{33}
1/2 Brahman	12	256-G_{33}

Lot IV

Corn	60
Urea in Molasses	40
(10# urea, 90# molasses)	

% Brahman or Africander	No.	Sire
3/8 Africander	30	84-H_4
1/2 Africander	33	79-H_2
1/4 Brahman	1	278-G_{44}
5/16 Brahman	2	279-G_{44}
5/16 Brahman	15	341-G_3
3/8 Brahman	27	256-G_{33}
3/8 Brahman	9	51-G_1
1/2 Brahman	13	331-G_2

In addition to the nutrition information, a comparison of growth rates, and detailed carcass studies will be made.

North Louisiana Experiment Station - Calhoun, La.

Facilities of this station include forty acres of pasture, barns, sheds, etc. An increase of pasture acreage is anticipated for 1951. At present, there is a purebred Devon breeding herd of nine cows and a bull, and a herd of twelve 1/2 Africander-1/2 Angus cows and a bull. The Africander-Angus herd is all red in color. Last year, reciprocal crosses were made and these calves will be dropped this spring. Next year's calf crop will be used to increase the two lines.

Animals produced at this station will be killed as slaughter calves or fed out at Calhoun, Baton Rouge, or some other substation. All slaughter animals will be killed at Baton Rouge and routine carcass data collected.

North Louisiana Hill Farm Experiment Station - Homer, La.

This is a new substation, and cattle work is just getting under way. About 300 acres of pasture is available for beef cattle. During the past year, this has been fenced and cross-fenced, water ponds established, and a barn constructed. No definite breeding program has been agreed on as yet for this station. This question should be decided and a program initiated during the coming year.

Iberia Livestock Experiment Farm - Jeanerette, La.

The entire herd and facilities of the Iberia Station have been made a part of this project. There is a complete cooperation between the Iberia Station and the Louisiana Agriculatural Experiment Station.

The original Africander-Angus herd was split three ways. The red 1/2 Africander-1/2 Angus herd went to North Louisiana Experiment Station at Calhoun; the 3/8 Africander-5/8 Angus herd went to Baton Rouge; the black 1/2 Afridancer-1/2 Angus remained at Jeanerette. The station also maintains a purebred Brahman herd and some Brahman-Angus crossbreds. In the future, a herd of purebred Angus will be added.

Work at Jeanerette is aimed at developing lines of cattle adapted to the Gulf Coast area from the crossbred foundation stock. The purebred Brahman and Angus lines are to serve as test lines for comparison and to provide further crossbred stock.

(b) Research results:

The project has not yet progressed to the point where any results are available. Limited information will be available next year.

4. Future plans:

It is planned to broaden the scope of the project to include fundamental as well as applied research. The primary concern for the next few years will continue to be a comparison of different purebreds, crossbreds, and methods of producing crossbreds. The objective being to try to discover the type of animal best suited to the peculiar environment and production practices of the Gulf Coast.

In addition, however, other fundamental studies are planned. Those that are definitely contemplated, or already under way, include:

(a) Growth and development (underway)
    1. Allometric studies
    2. Rates of sexual maturity
    3. Relative size among beef cattle.
(b) Heat tolerance studies.
(c) Estimation of genetic parameters of as many characters as possible.
(d) Efficiency of food utilization and the influence of heredity on efficiency of food utilization.
(e) Studies of specific gene action wherever possible -
    1. Color inheritance (relate to heat tolerance work)
    2. Horn inheritance
    3. Study of the "Doppelender" gene
    4. Any other specific gene or genes as the opportunity arises. Compact and dwarf genes segregating in purebred herds.
(f) Detailed carcass quality studies -
    1. Dressing percent
    2. Carcass measurements
    3. Tenderness, flavor, storage qualities, etc.

5. Publications:

There have been no publications based on this project.

6. Publications planned:

Three calves of Africander-Angus breeding exhibit the "Doppelender" character. An investigation of the inheritance of this character and detailed anatomical studies are planned. These should be completed and a manuscript ready for publication within a few months.

Steers of different lines of breeding (Africander-Angus and Brahman-Angus with respect to "percent blood") have been fed out at this station for the past two years. A third group is on feed at present. Carcass data will be available on all these groups and will be analyzed and published during 1951.

MARYLAND STATION

Submitted by J. E. Foster, Dec. 12, 1950

1. Project Title: C-14 A Study of the Productiveness of Purebred Beef Cattle in Maryland.

2. Objectives:

(a) To study productiveness of existing or introduced stocks of beef cattle. Productive characteristics measured will include rate of gain, market type, economy of gain, carcass quality, fertility, longevity, adaptation to environmental conditions, and other factors affecting the utility value of beef cattle.

(b) To compare selective criteria (individual and pedigree) with actual performance of progeny.

(c) To evaluate breeding technics for small purebred herds under the varying conditions encountered in practice in purebred herds.

(d) To attempt to produce beef cattle with superior productive capacities by linebreeding and selection. (Using criteria of selection as developed in this project and by cooperating stations in this and other regions.)

3. Accomplishments during year:

One Aberdeen-Angus and one Hereford herd are now in this project on a cooperative basis with private breeders. One Angus herd was dropped during the year.

In the Hereford herd, a total of 43 calves sired by 5 different bulls were weighed at birth and when approximately 6 months of age. Statistically significant differences were found between bulls (and between sexes) in birth and 180-day weights of their calves.

Thirty-five calves were dropped in the Angus herd, and three bulls were used to sire the crop. Calves by different bulls did not vary significantly in birth or 180-day weights.

4. Future plans:

Weights on calves will be secured and an attempt will be made to guide the breeding of the herds on the basis of records secured.

1. Subproject Title: C-14-a Effect of Early Weaning on the Duration of Maternal Influences in Beef Cattle.

2. Objectives:

(a) To attempt to develop a new technic for an earlier evaluation of feed lot performance, progeny testing, and genetic evaluation of beef animals.

(b) To develop sound feeding and management practices for beef calves weaned at an early age.

(c) To evaluate the calves' genetic ability to thrive under new systems of care.

3. Accomplishments during year:

(a) Eight additional feeding pens were constructed, so there is now a total of twenty-four stalls. New installations were constructed in the feed room, and additional barn and exercise lot space was made available. A herdsman has been assigned specifically to this project.

(b) 1949 Calf Crop: No statistically significant differences were found between groups of calves (a) weaned at 90 days and (b) those weaned at 180 days, in weight at birth, 90, 180, or 370 days of age. Differences in weight between sexes were found at 90, 180, and 370 days of age. Differences in weight between breeds were found at 90 and 180 days of age. Calves weaned at 90 days averaged "high-good" at 370 days in terms of condition only. Early weaning apparently did not affect growth, development, or bodily type in any adverse manner. Correlations between weights at the following ages for calves weaned at 90 days were: birth - 90, 0.49; birth - 180, 0.41; birth - 370, 0.43; 90 - 180, 0.70; 90 - 370, 0.65; 180 - 370, 0.67.

Correlations between T. D. M. consumed and total gain for ages 90 - 202, 202 - 314, and 314 - 370 days were 0.49, 0.79, 0.44, respectively. The calves were fed grain and hay independently ad lib. The average grain-hay ratio was 8:1; correlations between grain/hay and grain were not significant.

1950 Calf Crop: Eleven Aberdeen-Angus and four Hereford calves were weaned at 90 days of age, and six Angus and three Herefords were weaned at 180 days. Twenty-three calves, fifteen weaned at 90 days and eight weaned at 180, are now on individual feed. Rations and management are the same as for the 1949 calf crop. No statistically significant differences in weight at birth were found for weaning age groups or sex, but a breed difference was found. (Angus averaged 59 pounds, Herefords averaged 66 pounds.) At 90 days, no differences in weight were found in weaning age, sex, or breed. At 180 days, the only difference in weight was between weaning age groups.

Comparative Weights of Calves Weaned at Different Ages

	Weaning Age and Year			
	1949		1950	
Age	90	180	90	180
Birth	65(12)*	68(11)	61(15)	61(9)
90	210(12)	203(11)	195(15)	207(9)
180	346(12)	373(11)	324(15)	367(9)
370	674(12)	666(4)		

* Figures in ( ) indicate number of calves. Only 4 calves were fed from 180 - 370 days in the one group 1949; the other 7 were group-fed on a satisfactory ration.

Hereford calves of both seasons were half sibs but a different Angus bull sired the 1950 crop.

4. Future plans:

Calves of the 1951 crop will be handled in a manner somewhat similar to those in past years except the earlier weaned calves will be weaned when 7 - 10 days old rather than 90 days of age. Rations already developed for dairy calves will be used.

5. Publications: None

6. Publications planned:

The results of the years 1949 and 1950 will be summarized in the form of a M. S. Thesis.

1. Subproject Title: C-14-b Type Classification as an Aid in Selection of Beef Breeding Cattle.

2. Objectives:

To determine the value of type classification in beef cattle, i.e., heritability of beef type and production.

3. Accomplishments during year:

Three Aberdeen-Angus and two Hereford herds were classified during two different seasons. A total of 498 different animals have been classified; 217 of these were classified twice at different times during two seasons. Animals were rated on a scale of 1 (best) to 6 on: (A) general type and appearance, (B) head and neck, (C) forequarters, (D) body, (E) hindquarters, and (F) overall rating. Six judges were used, not all judging all herds. Statistically significant differences were found

between judges on a within herd-within season basis. Seasonal differences in type ratings on a within herd basis were also found. Correlations between judges on a within herd-within season basis ranged from 0.54 to 0.88. Some daughter-dam comparisons were made but numbers were too low to calculate heritability figures. The age and condition of animals influenced judge's opinions. Before a system of this type may be practical, it was indicated standards should be established for rating animals; judges should be schooled to prevent discrepancies in scoring animals, as some tend to rate all animals higher than others; animals should be viewed under similar circumstances; adjustments should be established for age, breed, sex, and condition.

4. Future plans:

The work on this subproject will probably be continued during the next year.

5. Publications:

The results of this study were presented in the form of a thesis in partial fullfillment of the requirements for a M. S. degree. On file in the library, University of Maryland.

1. Subproject Title: C-14-c Studies on Bodily Conformation and the Correlations Between Live-Animal Measurements and the Weight and Other Characteristics of Carcasses and Wholesale Cuts in Beef Animals.

2. Objective:

To study the correlations between linear measurements taken on the live animal and the weight of various wholesale cuts in order to explore the possibility of developing a technic for estimating probable carcass yield from linear measurements.

3. Accomplishments during year:

A series of 37 linear measures and four other items have been made on 98 live animals, and weights of 18 different wholesale carcass cuts have been secured for 50 of the 98 live animals measured. Linear measures were taken on the basis of (a) those previously taken by other workers, (b) points of reference used in ordinary judging practice, and (c) anatomical points in direct reference to the cutting points of the wholesale cuts. To date, 210 simple correlations have been calculated. Most of the associations between the weight of cuts and the associated linear measures have been correlated. The calculation of partial and multiple correlations has just been initiated.

4. Future plans:

Completion of the correlation studies is anticipated in the near future. From the best combinations of correlated factors, an attempt will be made to construct formulae using the minimum number of linear measurements which will give the best possible estimate of the weight of various wholesale cuts. Weight, condition, and breeding of the animals will also be used in constructing any formulae.

5. Publications: None

6. Publications planned:

The results of this study will be published in the form of a M. S. thesis.

Maryland Station

POSTWEANING PERFORMANCE OF 1949 CALVES FULL FED AFTER WEANING.

Line or group designation	Univ. of Md.	Univ. of Md.
Breeding of calves	Aberdeen-Angus	Hereford
Av. inbreeding (%)	Outbred herd	Outbred herd
Steers		
No.	8	4
Av. wean. wt.	383.8	409.0
Av. 12 mo. wt.	707.1	735.3
Length of feed. period	185 da.	185 da.
Feed per cwt. gain (lbs.)		
Concentrates	636	530
Roughage	63	50
Av. type score (12 mo.)	11	11
Heifers		
No.	6	6
Av. wean. wt.	353.8	344.2
Av. 12 mo. wt.	637.7	657.0
Length of feed. period	185 da.	185 da.
Feed per cwt. gain(lbs.)		
Concentrates	707.5	580
Roughage	75.0	77
Av. type score(12 mo.)	11	11

PERFORMANCE OF COW HERDS. 1950 CALVES

Line or group designation	Univ. of Md.	Univ. of Md.
Breed of sire	Aberdeen-Angus	Hereford
Breed of dam	"	"
No. cows bred	21	9
No. cows calving	21	8
No. calves raised	19	8
Av. inbr. of dams (%)	Outbred herd	Outbred herd
Av. inbr. of calves (%)	" "	" "
Av. birth wt. (lbs.)	59	66
Av. birth date	March 4	March 9
Were calves creep fed?	no	no
Av. wt. at 6 mo.(lbs.)	333.3	367.9
Av. wean. date *	Aug. 31	Sept. 5
Av. wean. type score	13	13
Av. wean. condition score	12	12

* For calves weaned at 6 months; half were weaned at 90 days.

NORTH CAROLINA STATION

Submitted by H. A. Stewart, Dec. 15, 1950

1. Project Title: State 74-ai28 The Improvement of Beef Cattle Through Breeding Methods.

State 46-ai17 The Development of Beef Cattle Especially adapted to the Coastal Plains Region of North Carolina and Similar Areas.

2. Objectives:

To compare groups of cattle from Brahman, Africander, and Romo Sinuano top-crosses on grade Hereford cows for their adaptability under Coastal Plains forest conditions.

To compare steer calves from these groups in the feedlot and at slaughter.

To establish breeding groups of cattle with the best performing of the top-crossed progenies.

To introduce red Africander-Angus breeding from Jeanerette into the Africander top-crossed group.

To obtain information on the feedlot performance of the purebred Hereford, the Brahman-Hereford F_1, the Africander-Hereford F_2, and the Romo Sinuano-Hereford F_1. Bulls to be used as sires next year.

To introduce new genetic material.

To study the total performance of progeny of bulls in the same herd.

3. Accomplishments during year:

Brahman-Hereford crossbreds were produced in 1950, and similar matings were made for the 1951 calf crop.

Lines are being formed by inter se matings within both the Brahman and Africander top-crossed groups. Four F_2 calves were produced in the Brahman-Hereford line. Not one of the 9 females in the Africander-Hereford line calved this year. This failure is attributed to the young bull used in 1949. Another bull from this group was used in the summer of 1950. A red bull calf from the Africander-Angus line at Jeanerette was purchased in November to be used in 1951.

Eighteen Romo Sinuano x grade Hereford calves were dropped as a result of the semen introduction program of last year. Three of these calves died under the rigorous environment of the forest. Ten bull and five heifer calves survived. The yearling heifer weighed 695 pounds at 12, and 890 pounds at approximately 18 months. These cattle have demonstrated their docile temperament. They are polled, and most of the group have a short, dense, smooth hair coat. Bull and heifer calves are being fed for information on rate of gain. The fastest growing bulls and heifers will be saved for breeding. Slower growing bulls will be used for carcass appraisal.

Seven purebred Hereford, two Brahman-Hereford F_1 and one Africander-Hereford F_2 bulls were fed for rate of gain data last winter. Four of the Hereford bulls were used to produce progeny for testing rate of gain, carcass appraisal, and cow productivity. All of the cross-bred bulls are polled. These bulls were used on cows of their own breeding in the forest area.

4. Future plans:

Inter se matings will be continued within each of the three groups; Brahman-Hereford; Africander-Hereford; and, Romo Sinuano-Hereford. Selections within each group will be based on rate of gain, reproductive performance, and carcass quality.

Prospective herd sires from all breeding groups, as well as a part of the replacement females, will be measured and fed for rate of gain for their first winter after weaning.

Two purebred Hereford yearling bulls that were feedlot tested have been bred to 48 grade Hereford cows at the Tidewater Test Farm. Two other tested yearling bulls were used on 46 grade Hereford cows at Laurel Springs. The cows were randomly allotted to the bulls at each station. The steer progenies produced will be fed together at the station. Evaluations will be made on feeder grade and slaughter grade of all steers, and carcass evaluations will be made on a sample of each progeny group. Heifers will be appraised at weaning and as long yearlings. Heifer gains on winter feed and pasture during this period will be compared to feedlot gains of their steer mates.

Two purebred Hereford bulls will continue to be sent to each of the two substations each year to check progeny feedlot performance against the feedlot gains of their sire.

5. Publications:

Stewart, H. A., and E. U. Dillard. 1950.
Summary of the Performance of Africander-Hereford, Brahman-Hereford, and Grade Hereford Groups at the North Carolina Experiment Station. N. C. Agr. Exp. Sta., A. H. Series 1, Progress Report 4.

6. Publications planned:

Godley, W. C., and H. A. Stewart.
A Comparison of Two Hereford Bulls Bred to Grade Hereford Cows.

This paper is to be presented at the meeting of the Association of Southern Agric. Workers at Memphis in February, 1951. An abstract will be published in Proceedings of that association.

North Carolina Station (continued)

POSTWEANING PERFORMANCE OF 1949 CALVES

Central Station, Raleigh

Breeding:	Purebred Hereford	Grade Hereford(1)	Brahman Hereford(1)	Africander Hereford(1)
Bulls				
No.	7		2(2)	1(2)
Av. wean. weight	431		315	260
Av. 12 mo. weight	774		317	470
Length feed. period	168		168	168
Feed/cwt. gain (lbs.)				
Grain	541		499	499
Hay	209		266	266
Av. type score(12 mo.)	11		8	8
Heifers				
No.	8	14	8	4
Av. wean. wt.	482	275	226	205
Av. 12 mo. wt.	655	500	404	341
Length feed. period	172			
Feed/cwt. gain (lbs.)				
Grain	770			
Hay	743			
Av. type score(12 mo.	11	9	7	7

(1) Calved in forest, wintered at Raleigh on small grain pasture.

(2) Fed together.

North Carolina (continued)

Steer Calves Produced in Forest, Dry Lot Fed at Raleigh, then Slaughtered.

Breeding group	Grade Hereford	Africander-Hereford	Brahman-Hereford
Number	12	4	12
Start of feeding period:			
Av. age - days	276	214	225
Av. weight - lbs.	295	214	249
Length of feed. period	229	229	229
Average winter gain	472	434	453
Feed per cwt/gain (lbs.):			
Grain	602	597	585
Hay	303	446	309
Av. 12 mo. weight	537	508	543
Av. type score, 12 mo.	9	7	7
Slaughter data:			
Av. age at slaughter	503	441	476
Av. shrunk slaughter wt.	767	639	702
Av. slaughter grade	Med. Good	Low Com'l	High Com'l
Av. dressing %	58.17	55.7	58.8
Av. carcass grade	Med. Good	Med. Com'l	High Com'l

Ration Fed: Ground barley full fed plus 2 pounds cottonseed meal per day plus lespedeza hay ad lib.

North Carolina (continued)

PERFORMANCE OF COW HERDS. 1950 CALVES

Frying Pan Experimental Range

Breeding group	Grade Hereford	Brahman-Here. F_1	Brahman-Here. F_2	Africander-Hereford	Romo-Sinuano Hereford
Breeding of sire	Purebred Hereford	Purebred Brahman	Brahman Here. F_1	Africander-Hereford	Romo-Sinuano
Cows	Grade Hereford	Grade Hereford	Brahman Here. F_1	Africander Here. F_1	Grade Here.
No. of cows bred	(20)	(20)	11	9	39
No. cows calving	9	5	5	0	19
No. calves surviving	6	5	4	0	15
Fx dams	0	0	0	0	0
Fx calves (%)	0	0	12.5	0	0
Av. birth date	5-26	6-8	4-15	-	2-25
Av. weight 6 mo.	225	208	319	-	308
Av. weaning date	11-29	11-29	11-29		
Av. wean. type score	8	7	7		7
Av. wean. condition score	5	5	8		8

(20) Forty cows in pasture with 2 bulls of different breeding. Each bull had equal opportunity to sire calves.

Calves were not weighed at birth nor creep fed.

SOUTH CAROLINA STATION

Submitted by E. G. Godbey, December 7, 1950

1. Project Title: The Use of Brahman and Certain British Breeds of Beef Cattle in the Production of Fat Calves.

2. Objectives:

To determine the birth and weaning weights, market grades, carcass grades, and dressing percentages of fat calves sired by Brahman, Hereford, and Angus bulls.

3. Accomplishments during year:

(a) Facilities and cattle acquired: Work with Angus cows was continued at the Coast station. Complete results were secured on 43 calves at this station.

Forty-five purebred Hereford cows were selected at the college and bred to Hereford, Angus, and Brahman bulls. A bull of each of the breeds was purchased for this work.

(b) Research results: Research results secured at the Coast Station are shown on the accompanying table. It is evident that the introduction of the Hereford-Angus cross may cause some difficulties in the interpretation of the data. All bulls were turned in at the same time, so differences in average age are apparently the result of differences in fertility levels of the bulls used. The within group regression of seven month weight on day in season calved was insignificant indicating that differences in time of calving were not an important factor influencing weight at seven months of age.

4. Future plans:

It is planned to carry this work for at least three more years at the Coast Station, and at the College. A summary of the results secured up to that time should indicate whether or not further work is necessary.

5. Publications:

Results of the work at the Coast Station have been published in the annual Experiment Station report. No other publications are planned at this time.

South Carolina Station (continued)

PERFORMANCE OF COW HERDS. 1950 CALVES

Line or group designation	Angus	H x A.	B x A
Location	Coast Station	Coast Station	Coast Station
Breed of sire	Angus	Hereford	Brahman
Breed of dam	Angus	Angus	Angus
No. cows bred	24	18	18
No. cows calving	23	18	18
No. calves raised*	21	16	15
Av. birth wt. (lbs.)	62	68	75
Av. birth date	Feb. 14	Mar. 10	Feb. 27
Were calves creep fed?	yes	yes	yes
Av. wt. at 7 mo. (lbs.)	470	527	512
Av. weaning date	Sept. 14	Oct. 10	Sept. 27
Calves slaughtered at weaning:			
1. Steer or bull calves			
No.	8	9	5
Av. age	7 mo.	7 mo.	7 mo.
Av. weight	494	557	558
Av. slaughter grade	17 M G +	16 M G	18 L G
Av. dressing percent	58.17	59.56	59.21
Av. carcass grade	18 L G	16 M G	17 M G +
2. Heifer calves			
No.	7	7	7
Av. age	7 mo.	7 mo.	7 mo.
Av. weight	443	501	479
Av. slaughter grade	17 M G +	14 M G	18 L G
Av. dressing percent	57.86	58.78	58.42
Av. carcass grade	17 M G +	16 M G	17 M G +

* Not all used on test.

TENNESSEE STATION

Submitted by Charles S. Hobbs and Harold J. Smith, Dec. 30, 1950

1. Project Title: The Improvement of the Producing Ability of Beef Cattle.

2. Objectives:

   (a) To develop lines, or line crosses, or combinations of lines and crosses, of beef cattle that will make the most efficient use of Tennessee pastures and forages and that will result in an improvement of such characters as rate of gain, economy of gain, carcass quality, fertility, and longevity.

   (b) To investigate the productiveness of existing lines of beef cattle.

   (c) To develop effective breeding techniques for improving the productiveness of existing lines of beef cattle.

   (d) To study the effect of different levels of nutrition on the development of type, conformation, economy of gain, fertility, and longevity.

3. Accomplishments during year:

   (a) Facilities and cattle acquired:

   Tobacco Experiment Station, Greeneville - Emphasis on pasture improvement to increase carrying capacity. Purchased 24 Hereford heifers (3 sire groups.)

   Highland Rim Station, Springfield - Constructed corral and chute; acquired and set up scales; seeded new pastures; set over about seventy-five acres more land for cattle pasture; purchased seven Hereford heifers (1 sire group.)

   Oak Ridge Station, Oak Ridge - Purchased 6 Hereford bulls for performance testing. Completed a new feeding and testing barn.

   Middle Tennessee Experiment Station, Columbia - Purchased a new farm which will permit an increase in cow units and allow an expansion of testing program facilities. Also purchased 20 head of Hereford (commercial) cows. This makes a total of 60 high grade Hereford cows available for progeny testing sires and other work.

   West Tennessee Experiment Station, Jackson - Constructed a new beef cattle barn; acquired and set up new scales; improved pastures to increase carrying capacity.

   University of Tennessee Agricultural Experiment Station, Knoxville The following cattle have been acquired during the year:

   1. Six Hereford calves (two trios) and three nurse cows for level of feeding study.

2. Twelve Hereford heifers of Helmsman 3rd breeding from F. M. Leech of Lexington, Virginia, as foundation for the development of a line.

3. Two Hereford heifers from J. Hoffman, Surgoinsville, Tennessee.

4. Three Hereford bulls for performance testing.

5. Twenty-four calves from branch stations to progeny test bulls in use at those stations.

6. Eight Hereford heifers from Smithdale Hereford Farms, Limestone, Tennessee, as a foundation for a line of Herefords.

(b) Research results: The experiment on early vs late calving was continued at the Greeneville station. A summary of the results to date of the crossbreeding phase of this project is given in accompaning table. All weights in this table are averages of weaning weights adjusted to a standard age of 210 days on the basis of average daily gain within the 28-day weight period in which the 210-day age fell. Heifer weights have been adjusted to a steer basis by multiplying 210-day heifer weights by a sex correction factor (1.085) calculated from all available data from the various branch stations. Inspection of this table shows that there is virtually no difference between AxH crossbreds and straight Herefords based on one Angus and two Hereford bulls. When weaning weights are adjusted to the same standard age, the data shows only a slight difference between early and late calves.

Growth data and weaning weights of calves at the Greeneville and Crossville stations are being analyzed in a study of the factors affecting weaning weights of calves and the development of correcion factors for use in adjusting weaning weights to a standard age. A paper will be presented on this phase of the work at the February, 1951, meeting of the Association of Southern Agricultural Workers at Memphis, Tennessee.

A study of methods of measurements was conducted at the Knoxville station with the following objectives:

1. To investigate the value of beef cattle photographs as permanent records.

2. To compare the relative accuracy and repeatability of live-animal and photographic measurements of beef cattle.

The results of this study are given in the following abstract from a paper presented at the 1950 meeting of the American Society of Animal Production:

Abstract

"Data from 10 cows, 23 yearlings, and 10 calves were analyzed to determine the relative accuracy and repeatability of live-animal and photographic measurements of beef cattle. Fairly high estimates for repeatability of single measurements on the same animal were obtained for the body measurements studied; namely, (1) length of body, (2) heights at withers, (3) depth of chest, and (4) patella to patella. Estimates of repeatability for body length for the three age groups varied from .546 to .898 for live-animal measurements, and .726 to .844 for photographic measurements. Repeatability for height at withers ranged from .888 to .906 for live-animal measurements, and .908 to .927 for photographic measurements. For depth of chest, estimates of repeatability varied from .784 to .914 for live-animal measurements, and .807 to .908 for photographic measurements. Repeatability of single measurements for the round measurements (patella to patella) were lower than those for the other measurements studied with a range of .463 for the cows to .769 for the yearlings.

Within the limits of this experiment, size did not appear to have any appreciable influence upon the errors of measurement although they were slightly greater for the larger animals. Estimates of repeatability, including both live-animal and photographic measurements for all items except patella to patella, varied from .546 to .918 for the cows, .762 to .914 for the yearlings, and .807 to .927 for the calves.

Photographic measurements gave slightly higher estimates of repeatability in a majority of cases with differences of highest magnitude occurring in body length of cows and yearlings. Live-animal measurements gave higher estimates for length of body in calves and depth of chest in calves and yearlings.

Correlation coefficients between the average of A. M., and P. M., photographs with various combinations of A. M., and P. M., live-animal measurements indicate in general that the two methods were measuring about the same thing. Correlation coefficients were slightly greater within methods than between methods.

Differences between measurements of the two men and between measurements in the A. M., and P. M., were too small a magnitude in almost every instance to have any real significance.

Photographs provide permanent objective visual records of individuals of progenies from which certain body measurements may be obtained with reliability which is comparable to or slightly greater in most cases than that of live-animal measurements."

The progeny of five bulls were fed in progeny test groups at one station and progeny of two bulls at another station. These results are being summarized.

A new portable scale unit has been developed, which can be loaded in a large pickup, to weigh cattle in various pastures or locations. This will permit working with cooperators and gathering more data at various station locations.

4. Future plans:

(a) Tobacco Experiment Station, Greeneville:

Continue time of calving (early vs late) and crossbreeding studies.

Progeny test the two bulls (one Hereford and one Angus) in use at this station. Heifers will be tested under winter pasture conditions and steers on a delayed feeding plan.

Secure foundation purebred Hereford heifers in changing from grades to purebreds.

Construct a new feeding barn and weighing unit.

(b) Highland Rim Station, Springfield:

Test one or two young bulls at this station.

Secure more foundation purebred heifers in changing from grades to purebreds.

Seed more improved pasture and complete new scale unit.

(c) Oak Ridge Station, Oak Ridge:

Progeny test five Hereford bulls.

Performance test eight Hereford bulls (two polled and 6 horned) by full feeding individually in drylot.

Compare progeny testing in drylot vs pasture.

(d) Middle Tennessee Experiment Station, Columbia:

Approximately 60 head of high grade Hereford cows will be used to progeny test 2 Hereford bulls performance tested at other stations.

As plans progress, the grade Hereford herd will be changed to a purebred herd.

(e) Plateau Experiment Station, Crossville:

Expand the purebred Angus herd (20 females at present) at this station.

Obtain an Angus bull as closely related as possible to the present group of cows with the purpose of developing a line.

Use four bulls for progeny test studies and proving bulls for the development of lines.

(f) University of Tennessee Agricultural Experiment Station, Knoxville:

Obtain 2 groups of 6-12 Hereford heifers (half-sisters) and a half-brother or sire to each group to inbreed for prospective Hereford lines.

Purchase 2 groups of 6-12 Angus heifers (half-sisters) and a half-brother or sire to each group, if funds are available, to inbreed for prospective Angus lines.

Progeny test, if sufficient numbers of calves are available, 2 bulls from the Greeneville station; 1 bull from the Springfield station; 2 bulls from the Main station; 4 bulls from the Crossville station.

Continue the development of the McCroskey line of Angus.

Breed Leech Hereford heifers to a proven sire for the development of a line.

(g) Permanent records to be obtained: Routine photographs for permanent records will be obtained in the photographic chute for the following groups of cattle:

1. All groups of cattle used in the development of inbred lines.

2. All progeny of the afore-mentioned groups (1) at designated intervals.

3. All permanent purebred breeding stock at Knoxville, including Hereford, Angus, and Shorthorn. Also all purebred Angus cows and calves at Crossville.

4. Trios used in the level of feeding study.

Weights, type ratings, condition grades and linear body measurements will be obtained as recommended by the Committee on Methods of Measurements.

Carcass data will be obtained on all animals involved in any phase of the breeding program which are slaughtered or sold for slaughter.

5. Publications:

A paper entitled "The Accuracy and Repeatability of Live-Animal and Photographic Measurements of Beef Cattle" was presented at the annual meeting of the American Society of Animal Production, Chicago, Illinois, November 23 and 24, 1950. Jour. An. Sci. 9:639.

6. Publications planned:

A paper entitled "Correction Factors for Adjusting Weaning Weights of Beef Calves" will be presented at the annual meeting of the Association of Southern Agricultural Workers at Memphis, Tennessee, February 5 and 7, 1951.

Three Years Crossbreeding Results[1] — Tennessee, (Greeneville Station)

		Early Calves (January and February)				Late Calves (March and April)			
		Angus X Hereford		Hereford X Hereford		Angus X Hereford		Hereford X Hereford	
		Steers	Heifers	Steers	Heifers	Steers	Heifers	Steers	Heifers
1948	No. calves	6	4	4	7	5	5	7	4
	Av. wt., lbs.	417	394	410	394	439	418	435	383
1949	No. calves	3	7	7	5	4	6	7	2
	Av. wt., lbs.	427	430	452	449	434	405	478	411
1950	No. calves	1	8	6	2	7	7	3	2
	Av. wt., lbs.	544	412	462	418	493	426	476	368
Total	No. calves	10	19	17	14	16	18	17	8
	Av. wt., lbs.	432	415	445	417	462	417	460	386
	Heifers Adjusted to steer basis[2] - lbs.		450		452		452		419
	No. calves	29		31		34		25	
	Av. wt., lbs. steer basis	444		448		457		447	
Grand Total	No. calves	60				59			
	Av. wt., lbs. steer basis	446				453			
Grand Total	Crossbreds (63 calves) av. wt. 451 lbs.; Herefords (56 calves) av. wt. 448 lbs.								

[1] All weights in this table are averages of weaning weights adjusted to a standard age of 210 days.

[2] Heifer weights adjusted to a steer basis by multiplying 210-day heifer weights by a sex correction factor (1.085) calculated from data available from the various branch stations.

Tennessee Station

PERFORMANCE OF COW HERDS. 1950 CALVES

Line or group designation	Early calving	Early calving	Late calving	Late calving	Cow herd
Location	Greeneville	Greeneville	Greeneville	Greeneville	Columbia
Breed of sire	Angus	Hereford	Angus	Hereford	Hereford
Breed of dam	Gr. Here.	Gr. Here.	Gr. Here.	Gr. Here.	Grades
No. cows bred	11	10	10	10	30
No. cows calving	10	8	10	9	30
No. calves raised	9	8	10	9	29
Av. birth wt. (lbs.)	64.9	74.2	64.9	66.8	72.9
Av. birth date	Jan. 15	Jan. 23	March 17	March 23	Feb. 15
Were calves creep fed?	no	no	no	no	no
Av. weight at 6 mo. (lbs.) (on nearest weighing date approximately)	365	381	403	383	392.0 (188 days)
Weaning date	Nov. 2	Nov. 2	Nov. 2	Nov. 2	
Av. wean. type score	HG	G	HG -	G	Not available
Av. wean. condition score	G	LG	LG +	HM +	" "

PERFORMANCE OF COW HERDS. 1950 CALVES

Line or group designation	Crossville	Grade Angus	Sire Testing	Sire Testing	McCrosky	Cow herd
Location	Crossville	Crossville	Crossville	Crossville	Knoxville	Knoxville
Breed of sire	Angus	Angus	Here. (WHR Worthy Duke)	Here. (OW Larry Domino)	Angus	Angus
Breed of dam	Angus	Gr. Angus	Grade	Grade	Angus	Angus
No. cows bred					10	27
No. cows calving	10	20	15	11	10	27
No. calves raised	10	20	15	11	5	26
Av. inbr. of calves (%)	-	-	-	-	12.5	-
Av. birth wt. (lbs.)	60.2	65.0	84.3	77.4	61.4	54.8
Av. birth date	Mar. 17	Apr. 1	May 3	May 6	Mar. 6[1]	Mar. 15[2]
Were calves creep fed?	no	no	no	no	no	no
Av. wt. at 6 mo. (lbs.) (adjusted)	368.8	393.2	479.0	462.0	355.5[1]	367.6[2]
Weaning date	Oct. 31	Oct. 31	Nov. 2	Nov. 2	Oct. 18[1]	Nov. 1[2]
Av. weaning type score	LC	C -	LC	HG -	HG +	HG +
Av. wean. condition score	-	-	HG	G -	LC	HG

1 These averages include 4 calves only - 1 calf dropped 7/8/50 not included.
2 These averages include 23 calves only - 3 calves dropped in September, 1950 not included.

TEXAS STATION

Submitted by Bruce L. Warwick, R. W. Colby and M. W. Hazen,
December, 1950

1. Project Title: R-M 607 Improvement of Beef Cattle Through Selection of Performance-Tested and Progeny-Tested Sires.

2. Objectives:

   (a) To determine the heritability of gain and other economic characteristics as beef conformation, quality of fleshing, earliness of maturity and size of animal.

   (b) To study the effects of the application of such information on the improvement of breeding herds.

   (c) To determine the mode of inheritance of the pigmentation of the eyelids and to determine the relationship of eyelid pigmentation to "cancer eye".

   (d) To make a more detailed analysis of the existing data resulting from the previous work that has been carried out under Texas Experiment Station Project 550.

   (e) To determine suitable and economical rations of locally grown feeds and supplements for proper development of young breeding stock in conjunction with Texas Station Project 550.

3. Accomplishments during year:

   (a) Balmorhea

   During the winter of 1949-50 a total of 112 bulls and 44 heifers belonging to 12 cooperators and representing progeny samples from 22 sires were fed for 143 days. The bulky growing ration of ground hegari bundles, ground alfalfa hay, and cottonseed meal (ration estimated to contain slightly under 35% concentrates) was self-fed. The average daily gain of 112 bulls was 2.21 pounds with sire progenies within the Hereford breed ranging from 1.79 to 2.35 pounds per day. A group of Santa Gertrudis and one of "Beef masters" gained 2.59 and 2.50 pounds per day, respectively.

   The 44 heifers averaged 1.68 pounds gain per day with sire progenies ranging from 1.60 to 1.76 pounds per day.

   During the present (1950-51) winter, 104 bulls and 54 heifers from 11 cooperators are being fed.

   Analysis of the results of work in previous years at Balmorhea indicates a high heritability for rate of gain, although it is recognized that environmental differences prior to being put on test may have persistent effects and thus tend to magnify differences in test performance between sire progenies. The possible relationship between test performance and certain tangible

factors possibly reflecting previous environmental differences has been investigated. Initial type and initial condition scores have shown small and insignificant intra sire correlations with rate of gain (actual correlations +.015 and -.163, respectively). The between sire correlation of -.668 between initial condition score and rate of gain indicates some tendency for cattle thin at the beginning of the test to gain at a greater rate than those that carried a greater degree of condition.

A station bulletin summarizing past work at this location is in process of preparation.

Bluebonnet Farm

Cooperative work was initiated here last year and during the 1949-50 season, 25 bulls and 20 heifers owned by cooperators were fed under test conditions in addition to animals raised at Bluebonnet. A total of 60 head of cattle owned by cooperators are on feed this (1950-51) winter.

Bulky growing rations are self fed. The first year's results were consistent with those from Balmorhea in indicating large differences between individual animals and between sire progenies.

Pan Tech Farm

Cooperative work at this location was initiated during the current year with 71 bulls owned by 15 men and representing 20 sire progenies now on test.

4. Publications:

Patterson, R. E., J. H. Jones, J. J. Bayles, and R. V. Turnbough. Performance-Testing and Progeny-Testing of Beef Breeding Stock as an Aid to Selection. Jour. An. Sci. 8:608, 1949. (abstract.)

Jones, J. H., J. J. Bayles, R. E. Patterson, and G. W. Barnes. Cooperative Feeding of Young Breeding Stock in Sire and Progeny Tests. Abstract p. 66, Proceedings of 47th Annual Convention, Association of Southern Agricultural Workers, 1950.

1. Project Title: R-M 650 Improvement of Beef Cattle Within Pure Breeds and Certain of Their Crosses Through Breeding Methods, Based on Evaluation Tests for Efficiency and Rate of Gain, Heat Tolerance and Carcass Value.

2. Objectives:

(a) The improvement of beef cattle by selection based on rate and economy of gain, breeding efficiency and carcass value.

(b) To evaluate cattle with regard to environment, especially heat tolerance.

(c) To develop strains of beef cattle especially adapted to southern climatic conditions by a breeding program using Brahman cattle and one of the European breeds.

(d) To improve the carcass value of cattle of predominately Brahman breeding by introducing characteristics from one of the European breeds.

3. Accomplishments during year:

The work on this project is located at Bluebonnet Farm, McGregor, Texas. The 1950 calf crop was sired by the two highest gaining bulls (Herefords) at the 1948-49 Balmorhea tests, one other Hereford, and by five Brahman bulls on loan from private breeders. Most of the cows were unregistered Herefords used on the crossbreeding phase of the project.

All calves raised in 1950 are now on an evaluation test for rate of gain (only exceptions are one crossbred heifer which was fatally injured during the start of the test and so was slaughtered, and one cull Hereford steer calf which is sick and has been removed from the test.) It is the expectation to carry through carcass studies on at least representative steers from the different sire groups. Heat tolerance tests have not yet been set up, but we hope to be able to during the next year. Selections based on records at weaning, and while on test, will be used both within the breeds and among the crossbreeds. Back-crossing each way will be used and the resulting selections thoroughly compared with the parental breeds in the herd, and with cattle belonging to cooperating breeders. Attached are summaries of "performance of cow herds, 1950 calves" and "post weaning performance of 1949 calves, full fed after weaning." It should be noted that the full fed calves were fed a growing ration, rather than a high concentrate fattening ration. The highest percent concentrate during the last part of the test period was 50%.

1. Project Title: R-M 714 Methods for Measuring Potential Efficiency of Feed Utilization in Immature Cattle. (Located in the Nutrition Laboratory at College Station.)

2. Objectives:

The development of tests that will measure the potential rate of gain and feed efficiency of calves at an immature stage.

3. Accomplishments during year:

(a) Facilities and cattle acquired: During the past year, ten bull calves have been acquired. The ten calves consist of five registered Hereford bulls of moderately compact type and five Santa Gertrudis crossbred bulls. These bull calves will be used for various blood and metabolism tests during the forthcoming year.

(b) Research results:

Tests have been made of levels of various constituents in blood of ten beef steer calves in order to find any that might be correlated with rate of gain and thus might serve as a measure of potential rate of gain of a calf while still at an immature stage. Blood urea, non-protein nitrogen, creatine, creatinine, glucose, and cholesterol have been studied. The mean levels of the following constituents, standard deviation and correlation coefficient with rate of gain are shown:

Blood urea = 11.98 mg. per cent, s = 2.28, r = -.55, non-protein nitrogen = 37.06 mg. per cent, s = 4.04, r = -.019, creatine = 2.20 mg. per cent, s = 0.18, r = -.22; creatinine = 1.32 mg. per cent, s = 0.016, r = -.28; and glucose = 68.2 mg. per cent, s = 2.25, r = .43.

None of these are correlated with rate of gain to a significant extent.

In a test with a limited number of bull calves (15), blood level of cholesterol shows promise. Average level of cholesterol is 195 mg. per cent, s = 23.4, r = .98. This is significant with bulls. No significant correlation was found with heifers on the basis of limited data. Tests with 78 steers on pasture indicated a moderate, though not significant, correlation between blood cholesterol and rate of gain. Our tests indicate that blood cholesterol is affected by the fat level of the diet, hence, even though it is significantly correlated with rate of gain of bulls, it is not felt that it would be a satisfactory measure of potential rate of gain.

A digestion trial was also conducted with these ten steers. Data was collected to determine the degree of correlation between rate of gain and digestion coefficients, between feed efficiency and digestion coefficients, and between rate of gain and feed efficiency.

Results from the two digestion trials accomplished with the ten calves indicated that differences in rates of gain were probably not due to individual differences in digestive powers of the animals. This same conclusion may be drawn when the results are considered either for a weight-constant period, or on a time-constant basis.

There was an indication, from the data, that digestion of crude fiber was related to feed efficiency, although only one correlation coefficient ($r = 0.68$, d. F. = 8) obtained was of sufficient magnitude to be significant. The other correlation coefficients for crude fiber followed a similar pattern and approached significance. Digestion of other food nutrients did not appear to be related to feed efficiency under these conditions.

Feed efficiency was found to be significantly correlated with rate of gain, both on a time-constant basis and on a weight-constant basis. On a 299-day time-constant period, the correlation coefficient between feed efficiency and rate of gain was -0.64. On a 300 pound weight-constant basis, this correlation was -0.95. This latter portion of the data is only of academic interest since the calves would still have to be grown out in order to measure either growth rates or feed efficiency.

Preliminary studies have been carried out on the relationship of the essential amino acid content of the blood of calves to the potential ability of the animals to make rapid and economical gains. These studies so far are not complete enough to draw final conculsions; however, there is some relationship that the determination of lysine in the blood may be quite useful in studies of this kind.

4. Future plans:

The ten bull calves will be carried on test this year and used in tests of metabolic rates and various hormone studies. Blood samples are being collected from various other growth tested animals over the state to be used in supplementing this data.

5. Publications:

Colby, R. W., J. H. Ware, J. P. Baker, and C. M. Lyman. The Relationship of Various Blood Constituents to Rate of Gain in Beef Cattle. Jour. An. Sci. 9:652, 1950. (abstract.)

6. Publications planned:

Data will be published as positive results are obtained and proven.

POSTWEANING PERFORMANCE OF 1949 CALVES FULL FED AFTER WEANING*

Texas Agricultural Experiment Station - Bluebonnet Farm

Line or group designation	Registered Herefords	Unregistered Herefords
Location	Bluebonnet	Bluebonnet
Breeding of calves	Hereford	Hereford
Bulls		
No.	3	none
Av. weight 11-9-49	546.8	
Av. weight 4-12-50	871.8	
Length of feeding period	154	
Feed per cwt. gain (lbs.)		
Concentrates Roughage	Fed in mixed pens	
Av. daily gain	2.11	
Av. type score (12 mo.)	3--	
Heifers		
No.	4	61
Av. weight 11-9-49	386.2	436.6
Av. weight 4-12-50	561.2	623.4
Length of feeding period	154	154
Feed per cwt. gain (lbs.)		
Concentrates Roughage	Fed in mixed pens	
Av. daily gain	1.14	1.21
Av. type score (12 mo.)	3--	3

* Growing ration. Maximum concentrates for bulls 50%, for heifers 35%.

POSTWEANING PERFORMANCE OF 1949 CALVES FULL FED AFTER WEANING*
(or pastured for high gains)

Texas Agricultural Experiment Station
(Animals owned by co-operators)

Line or group designation	Brahman	Hereford	Angus
Bulls			
No.	4	8	13
Av. weight 11-9-49	357.5	510.6	540.6
Av. weight 4-12-50	576.25	577.5	846.5
Length of feeding period	154	154	154
Feed per cwt gain (lbs.)			
Concentrates	Fed in mixed pens		
Roughage			
Av. daily gain on test	1.42	1.73	1.99
Av. type score (12 mo.) April 12	3-	3	3+
Heifers			
No.	20		
Av. weight 11-9-49	338.75		
Av. weight 4-12-50	499.75		
Length of feeding period	154		
Feed per cwt. gain (lbs.)			
Concentrates	361		
Roughage	759	Fed in mixed pens	
Av. daily gain	1.05		
Av. type score (12 mo.) April 12	3- to 3		

* Growing ration. Maximum concentrates for bulls 50%, for heifers 35%.

PERFORMANCE OF COW HERDS. 1950 CALVES

Texas Agricultural Experiment Station

Line or group designation	Registered Brahman	Registered Hereford	Testers	F.
Location	Bluebonnet Farm, McGregor, Texas			
Breed of sire	Brahman	Hereford	Hereford	Brahman
Breed of dam	Brahman	Hereford	Unregis. Hereford	Unregis. Hereford
No. cows bred	5	19	44	179
No. cows calving	2	12	39	116
No. calves raised	2	12	37	102
Av. birth wt. (lbs.)	66.0	64.2	77.0	83.2
Av. birth date	Apr. 25	Apr. 2	Apr. 1	Apr. 13
Av. weaning weight	350.0	367.1	434.6	452.2
Were calves creep fed?	no	no	no	no
Av. adjusted weight at 6 months (lbs.) 2/	344	327	371	404
Av. age at wean. (days)	184.0	207.4	218.6	207.1
Av. wean. date 1/	Oct. 26	Oct. 26	Oct. 26 & Nov. 21	Oct. 26 & Nov. 21
Av. wean. type score (heifers	3	3.5	3	3
Av. wean. type score (bulls	--	--	16	22
Av. wean. type score steers				
Av. wean. condition score	Med. thin	Med. thin	Med. thin	Med. thin

1/ All calves weaned October 26, except 12 F. and 2 Tester heifers. These May calves weaned November 21.

2/ Regression for all calves is $\bar{y} = 70.18 + 1.556\ x$. Subgroup averages adjusted to 180-day equivalent by proportion.

VIRGINIA STATION

Submitted by C. M. Kincaid and A. L. Baker, December 15, 1950

1. Project Title: The Improvement of Beef Cattle for Virginia Through Breeding Methods.

2. Objectives:

(a) To study the productivity of stocks of beef cattle now used in Virginia.

(b) To develop methods for estimating the breeding value with respect to type, growth rate and efficiency of young bulls.

(c) To establish, maintain and develop herds of beef cattle within the pure breeds that will be highly adapted to the Appalachian region, as measured by their ability to utilize grass and rations with limited concentrates, in the efficient production of animals which yield high quality carcasses of desirable type and conformation.

(d) To estimate the progress to be expected from mass selection as compared with family selection in the improvement of beef cattle.

(e) To evaluate selection criteria and procedures and develop more precise and effective measures of quality and performance in beef cattle.

(f) To simplify the methods of progeny or sib testing whereby breeding cattle can be evaluated at comparatively young ages.

(a), (b), and (c), above, give the objectives of the initial project outline for Virginia started in 1947 at Blacksburg.

(d), (e), and (f), above, include the objectives of the Cooperative Project Agreement (A. H. 150.16.1) between the Virginia Agricultural Experiment Station and the Bureau of Animal Industry and the Agricultural Research Administration of the United States Department of Agriculture dated March 1, 1950, for co-operative research at the Beef Cattle Research Station, Front Royal, Virginia.

3. Accomplishments during year:

(a) Facilities and cattle acquired: Breeding research with beef cattle under S-10 includes herds at three locations, Blacksburg, Front Royal, and Middleburg. The main general effort up to now for the program as a whole has been to expand numbers of females to the capacity of land and facilities available, at the three stations. When possible, females have been used for research at Blacksburg in order to have them for the breeding herds at the conclusion of the experiments in which they were used. The facilities and cattle at each location is outlined in the following section:

BLACKSBURG

The test herd of Grade Hereford cows was increased to 120 head during the past year. It is expected that the herd will be maintained at approximately this size in the future. Twenty-four purebred Hereford heifer calves were purchased at weaning in the fall of 1949 for feeding and grazing tests at Blacksburg. At the completion of these tests in October, 1950, these heifers were transferred to Front Royal to become a part of the Hereford herd at that station. Four Hereford, four Angus, and two Shorthorn bulls from Record of Performance Tests at Front Royal were mated to twelve cows each for further estimates of differences between the progenies of high and low performing bulls.

Progeny from the first set of R. O. P. bulls (fed November, 1947, to April, 1948) were fed out. The steers were tested under individual full feeding and the heifers on wintering rations followed by pasture alone. Calves from the second set of bulls, are on feed at the present time.

FRONT ROYAL

The Beef Cattle Research Station, Front Royal, Virginia, contains 4,000 acres, of which about two-thirds is in pasture or permanent meadow. The station is the property of the United States Department of Agriculture and is operated under a cooperative agreement between the Virginia Agricultural Experiment Station and the Bureau of Animal Industry and the Agricultural Research Administration of the United States Department of Agriculture.

The same long-time breeding program will be carried out with each of three major beef breeds, Aberdeen-Angus, Hereford, and Shorthorn. The general scheme is to build research herds within each breed from samples of related females with each such sample providing the foundation for one closed line and two sub-samples for herds to be improved by mass selection. Selection in one of these herds will be for rate of gain and efficiency, and in the other for type and conformation. Within each breed the number of females in the closed lines will equal the number in the two selection herds. In general, each foundation sample will be the progeny of an outstanding sire. Until cattle numbers equal the capacity of the land the main effort will be to expand numbers.

The Shorthorns are near the numbers contemplated for them and are much farther advanced from the research standpoint than either of the other herds. The allocation of females from within two related groups of Shorthorns as shown in the section on Shorthorns illustrates the manner of forming the research herds.

Aberdeen-Angus

Twenty-five head of Bureau-owned heifers and cows purchased in June, 1949, and thirty head of mature cows and heifers obtained by the Station under a loan agreement, were available for 1950

breeding herds. The cows owned by the Bureau were mated to an Eileenmere bull owned by the Middleburg Station. The cows under loan agreement were divided into three random groups for progeny testing three young bulls which had been on Record of Performance Feeding Tests during the winter of 1949-1950.

Herefords

One hundred purebred Hereford cows and heifers were obtained by the station under a loan agreement on a share basis for a five-year period. Seventy-six of these females, available for breeding in 1950, were divided into two samples and mated to two bulls of contrasting types which had been on Record of Performance Feeding Tests the previous winter. Some of the twenty-four Hereford females transferred from Blacksburg were bred so that the total Hereford cows bred in 1950 was approximately ninety head. There are one hundred and thirty-seven Hereford females, including 1950 calves, in the herds at the present time. A six-year old, Larry Domino, Hereford bull, proven from the standpoint of type and conformation of progeny, was purchased for use as a foundation sire in 1951.

Shorthorns

The Shorthorn herd includes two more or less separate lines of breeding; one tracing to Sni-A-Bar Type 1637061 acquired in 1930 for use on Vint Hill Challenger cows, and the other line tracing to progeny acquired in 1933 of the imported bull, Calrossie Lord Rothes. From several sets of half-sib groups in each of these two lines, it was possible to obtain two sets of foundation females with 32 cows in each set which were randomized to research herds as follows:

A1 Closed line of Sni-A-Bar Type breeding.
B1 Closed Line of Calrossie Lord Rathes breeding.
A2B2 Sample of half-sibs to A1 and B1 above, for a herd to be selected for growth rate and efficiency.
A3B3 Sample of half-sibs to A1 and B1 above, for a herd to be selected for type and conformation.

Thirty-eight Shorthorn cows not in the above foundation herds were divided into random groups for progeny testing three young bulls not related to the cows in the herd. The purpose of these progeny tests is to find a sire or sires good enough to be used as a foundation bull from which to obtain samples for expansion of foundation research herds.

MIDDLEBURG

A pasture research station was established recently at Middleburg, Virginia, with land and funds obtained by private grant from Mr. Paul Melon. This station, under the direct supervision of R. E. Blaser of the Agronomy Department, is to investigate pasture problems, but the breeding program for beef cattle is under the

direction and supervision of Animal Husbandry and will be integrated with other breeding work in the state. A pure-bred Aberdeen-Angus herd was established through the purchase of fifty-nine heifers and two bulls in November, 1949. The heifers were purchased in sets of six or more paternal half-sibs and the two bulls were not related to the heifers.

(b) Research results:

Sire Testing

The data in the attached tables on post weaning performance of 1949 steer calves full fed after wearing, and production of yearling heifers designated as "High" and "Low", are the data from progeny of the first sires which were fed on R. O. P. prior to selection of high and low for direct estimates of heritability of growth rate and efficiency. The numbers are small and the data at most merely provide suggestions, but the steers do line up in the same relative order as their sires did with respect to weight for age, rate of gain, and type rating. The differences among the steer progenies were not significant but taken at face value they yield estimates of heritability for rate of gain, feeder grade and carcass grade of 28, 56, and 90 percent, respectively. The winter gains, pasture gains, and weights at 18 months of age of the heifers show small differences actually favoring the progeny of the low bulls for all three traits, but the differences are of the magnitude expected from chance. The order of the differences in rate of gain for the steers on full feed and the heifers on pasture suggests that heritability of growth rate may not be large.

The average performance on individual Record of Performance Feeding Tests of high and low gaining bulls by groups within years for the past three years is shown in accompanying table. One of the striking things about these data is the rather high relationship between feed consumption and size of the animal as contrasted with the relationship between daily gain and size. Feed consumption increased significantly as weight increased whereas daily gain was more or less independent of size. The average regression of feed consumption on size amounted for a 100-day period to approximately one pound of feed for each pound of difference in weight. This indicates that estimates of efficiency based on feed required per unit of gain may be of little value unless the animals compared are the same size. The feed consumption of high and low bulls in the same group was about the same, even though the daily gains were widely different. It seems that efficiency within these groups of bulls was almost entirely a matter of rate of gain.

Grazing tests with individual supplementary grain feeding at the rate of one percent of body weight per day in addition to pasture from July to November were done with part of the bulls fed in 1949-1950 (see footnote (2) of accompanying table.) Average daily gains for the Hereford and Angus in these grazing

tests of 1.92 and 1.29 pounds per day, respectively, do not reflect real breed difference, because the Herefords were already on feed when the test started whereas the Angus went directly on test when they came to the station without any adjustment period. When it is considered that this grazing period included the time of lowest seasonal gains, these gains are reasonably satisfactory. The correlation of (+ .48) between pasture and dry lot gains within breed was significant at the five per cent level.

Average Performance on Individual Record of Performance Feeding Tests of High and Low Gaining Bulls by Groups Within Years.

Year and Group(1)	Number Fed	Number Progeny Tested	Initial Weight	Days Fed	Daily Gain	Type Rating	Daily Feed Grain	Daily Feed Hay
47-48H	8	2 High	594	162	1.94	11.3	12.2	8.2
		2 Low	619	162	1.75	13.1	12.3	8.0
48-49H	24	4 High	520	133	2.09	11.0	10.8	4.2
		4 Low	642	133	1.45	12.1	11.1	4.3
49-50H(2)	6	1 High	870	112	2.16	11.8	17.8	7.0
		1 Low	895	112	1.38	11.7	16.8	6.0
A(2)	11	2 High	775	112	2.12	10.7	15.0	6.9
		2 Low	722	112	1.61	8.4	14.7	6.6
H	6	1 High	566	167	2.09	11.0	10.8	5.3
		1 Low	584	167	1.68	9.3	10.0	6.1
S	4	1 High	495	184	1.95	12.1	10.6	5.1
		1 Low	503	182	1.68	12.2	10.2	5.3
Average of all bulls for three year period		11 High	613	140	2.06	11.2	12.4	5.9
		11 Low	657	140	1.57	11.3	12.3	5.8

(1) The letters indicate breed as follows: A - Aberdeen-Angus, H - Hereford, S - Shorthorn.

(2) These 1948 fall calves were obtained in July 1949 and fed a daily grain ration equal to one per cent of body weight in addition to pasture for 128 days prior to the dry lot feeding tests shown here. All other 1949-1950 bulls were spring calves.

From a study of the data in R. O. P. bull feeding for the three-year period, B. M. Priode concluded:

1. The variation of the correlation between rate of gain and type from small negative to small positive values indicates these two characteristics are independent.

2. A single general score in which an animal is given a single type rating seems to be about as effective in measuring type as a detailed score card.

3. The variability among men in this study makes the use of a committee desirable in rating animals as to type. The data also indicate that animals on feeding tests should be rated on at both the beginning and end of the test.

4. The standard deviation of average daily gain for a feeding period of four to eight months is likely to be within the range .15 to .20 of a pound per day.

5. Heritability of rate of gain was estimated at 19 per cent in this study.

6. Approximately one-third of the bulls fed were selected for rate of gain. One-half of those selected were fastest gainers and the others slowest gainers. This procedure achieved a selection differential of about three standard deviations.

Measurement of Performance

Carter and Kincaid (1950), in a study of seasonal variation in rate of gain from data of over 1000 steers in pasture experiments at the Virginia Station during a period of some 15 years, found that the highest rate of gain was made in the spring and early summer months. A low point was reached in midsummer of each season but the time and magnitude of the reduction in gain varied from season to season. The gain increased in early fall but declined after about the middle of October.

An analysis was made of data on cattle weights to estimate the relative precision of estimating end weights from the trend of weights at intervals a week or more as compared with weights on a single or successive days at the beginning and end of experimental periods. The study so far indicates that the estimation of end weight from the trend of weights at intervals largely provides insurance against the hazard of unusual circumstances at the beginning or end of an experiment. Much of the time, the use of the trend gave little or no improvement, but in some instances the precision was improved markedly.

4. Future plans:

The main objective for the program as a whole is to build the numbers at Front Royal to the capacity of the station as rapidly as possible. The expected inventory there when fully stocked is as follows:

Breed	Bred Cows and Heifers	Heifers		Steers		Bulls		Calves	Total
		Yr.	Calves	Yr.	Calves	Old	Yr.		
Angus	100	20	40	28	28	4	6	12	238
Hereford	200	40	80	56	56	8	12	24	476
Shorthorn	125	30	52	36	36	4	6	16	305
Totals	425	90	172	120	120	16	24	52	1,019

It is contemplated that the permanent herds at Front Royal will be purebred, but until there are surplus females in the Virginia program, it is planned to move surplus grades from Blacksburg to Front Royal.

There are on R. O. P. feeding at Front Royal, 9 Aberdeen-Angus, 11 Hereford, and 7 Shorthorn bull calves all owned by the station. The most promising in each breed will be progeny tested in 1951 as part of the search for foundation sires in each herd. High and low gaining bulls in each breed will be selected for mating with cows in the test herd at Blacksburg. Some 12 to 15 of these R. O. P. bulls not used in the program will be sold at auction, in April, 1951, as part of the annual Spring Field Day to be held at Front Royal. Full results of feed consumption, gain, weight, etc., will be published on each bull sold.

The proven Larry Domino Hereford bull recently purchased will be mated to at least 40 cows at Front Royal for the purpose of obtaining a foundation sample of females. It is planned to obtain in all approximately 30 daughters from this bull. If calves from any young bull mated in progeny tests in 1950 look promising that bull will be used extensively in 1951 in order to be building up a set of daughters in case he is of foundation caliber.

The test herd of grade Herefords will be continued at Blacksburg. From the High vs. Low Progeny Tests steer calves will be full fed individually and heifer calves will be fed wintering rations prior to the measurement of their performance on pasture.

The Middleburg herd will be bred for fall calves with each set of half-sibs divided in two random samples for mating to one or the other of two differently bred bulls that are not related to any of the females. Calves produced by this herd will be weaned in the spring for use in grazing tests after weaning. This herd will furnish information on the usefulness of fall calves in an area that produces beef cattle largely from pasture.

5. Publications:

Carter, R. C. and C. M. Kincaid.
Season Variation in Rate of Gain of Beef Steers on Pasture. Association Southern Agricultural Workers, 47th Annual Convention, Biloxi, Mississippi. 1950. (abstract)

Priode, B. M.
Difference in Performance of Potential Herd Sires. Thesis for M. S. Degree, Virginia Polytechnic Institute. 1950.

6. Publications planned:

Estimating End Weights from the Trend of Periodic Weights.

Summary of Animal Husbandry Research at the Virginia Station.

Production of Slaughter Steers from Pasture.

Virginia Station

PERFORMANCE OF COW HERDS. 1950 CALVES

Line or group designation	High 1 (B-27)	High 1 (B-21)	Low 1 (F-102)	Low 1 (F-84)	High 2 (Road 56)	High 2 (C-89)	Low 2 (V-727)	Low 2 (C-102)
Location	Blacksburg	Blacksburg	Blacksburg	Blacksburg	Blacksburg	Blacksburg	Blacksburg	Blacksburg
Breed of sire	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Breed of dam	Gr. Here.	Gr. Here.	Gr. Here.	Gr. Here.	Gr. Here.	Gr. Here.	Gr. Here.	Gr. Here.
No. cows bred	12	12	12	12	12	12	12	12
No. cows calving	9	10	9	12	12	11	11	9
No. calves raised	9	9	9	12	10	11	11	8
Av. birth wt. (lbs.)	71	72	71	76	72	62	66	74
Av. birth date	Mar. 12	Mar. 16	Mar. 22	Mar. 12	Apr. 4	Apr. 3	Apr. 4	Apr. 2
Were calves creep fed?	no	no	no	no	no	no	no	no
Av. wt. at 6 mo. (lbs.)	412	444	416	412	389	364	345	368
Av. weaning date	Oct. 13	Oct. 13	Oct. 13	Oct. 13	Oct. 13	Oct. 13	Oct. 13	Oct. 13
Av. wean. type score	11.8	11.8	11.4	12.1	12.1	11.8	11.8	11.8
Av. wean. condition score	12.0	12.8	10.2	12.2	11.0	10.8	11.0	11.8

Virginia Station

PERFORMANCE OF COW HERDS. 1950 CALVES

Line or group designation[1]	Line Herd A	Line Herd B	Test Herd A	Test Herd B	Test Herd C	Hereford	Angus
Location	Front Royal	Front Royal	Front Royal	Front Royal	Front Royal	Front Royal	Front Royal
Breed of sire	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Hereford	Angus
Breed of dam	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Hereford	Angus
No. cows bred	20	17	17	17	17	See footnote 2	See footnote 2
No. cows calving	16	15	13	13	13	59	27
No. calves raised	13	14	11	8	12	56	26
Av. inbr. of dams (%)	5.0	5.9	7.8	10.1	18.0	None[3]	None[3]
Av. inbr. of calves (%)	13.7	8.1	7.5	8.8	9.9	None	None
Av. birth wt. (lbs.)	77.1	69.1	68.7	67.4	65.5	68	65
Av. birth date	Mar. 26	Mar. 31	Mar. 20	Mar. 22	Mar. 21	May 3	Apr. 1
Were calves creep fed?	no	no	no	no	no	no	no
Av. wt. at 6 mo.(lbs.)	382.6	378.1	399.1	383.4	331.3	357	382
Av. weaning date	Oct. 11	Oct. 11	Oct. 11	Oct. 11	Oct. 11	Oct. 12	Oct. 12
Av. wean. type score	12.0	11.5	12.1	11.1	10.1	11.2	10.7

1 Herd designations for the Shorthorns at Front Royal are in accordance with the breeding system prior to the adoption of the general research program with each of the breeds at Front Royal.

2 The number of cows bred in each of these groups is not included for the reason that the cows had been bred for more or less continuous calving prior to the time they came to the Experiment Station.

3 Inbred coefficients were not computed for these groups. They were outbred and more or less unrelated so that the inbreeding, if any, of any animal in the group would be quite small.

POSTWEANING PERFORMANCE OF 1949 CALVES FULL FED AFTER WEANING

Virginia Station

Line or group designation	High 1	High 2	Low 2
Location	Blacksburg	Blacksburg	Blacksburg
Breeding of calves	Grade Hereford	Grade Hereford	Grade Hereford
Av. inbreeding (%)	0	0	0
Steers			
No,	3	5	5
Av. weaning wt.	401	417	406
Av. 12 month wt.	756	738	735
Feed per cwt. gain (lbs.)			
Concentrates	728	767	689
Roughage	208	214	203
Av. type score (12 mo.)	9.9	10.5	12.1
Slaughter data			
Av. age at slaughter(days)	439	438	425
Av. weight at slaughter	900	908	874
Av. slaughter garde	11.2	10.7	12.1
Av. dressing per cent	60.4	59.6	59.6
Av. carcass grade	10.7	11.0	11.2

POSTWEANING PERFORMANCE OF 1949 CALVES FULL FED AFTER WEANING
(or pastured for high gains.)

Virginia Station

Line or group designation	Group I	Group II	Group I	Group II
Location	Front Royal	Front Royal	Front Royal	Front Royal
Breeding	Angus	Angus	Hereford	Hereford
Numbers	12	11	10	6
Bulls[4]				
Initial weight	568	723	584	875
Average gain	163	198	242	216
Length of feeding period (days)	125	112	125	112
Feed per cwt. gain (lbs)				
Concentrates	437	783	342	878
Roughage	Pasture	363	Pasture	344
Av. type score	10.0	9.4	11.0	11.8

4 These groups of bulls were born in the fall of 1948 and brought to the station in July, 1949. They were individually fed grain at the rate of 1% per day of body weight with the results shown for the I Groups. In November, part of the Hereford and all of the Angus were put on full feed under dry lot conditions with the results shown under II Groups. One Angus foundered and was removed from the test, hence, the difference in the number in Group I and Group II for this breed. High and low gaining bulls in the II Groups, and in the III Groups which follow, were mated to cows in the test herd at Blacksburg.

POSTWEANING PERFORMANCE OF 1949 CALVES FULL FED AFTER WEANING

Virginia Station

Line or group designation	III	III	III
Location	Front Royal	Front Royal	Front Royal
Breeding	Angus	Hereford	Shorthorn
Numbers	5	7	4
Bulls[5]			
Av. initial weight	429	522	482
Av. gain	292	297	330
Length of feeding period (days)	167	167	182
Feed per cwt. gain			
Concentrates	594	572	578
Hay	257	285	295
Av. type score	11.5	13.6	13.0

[5] These bulls were spring calves. The Angus and Herefords were started on feed at weaning in November. The Shorthorns were put on feed when they reached 6 months of age. Each bull was fed individually for maximum food consumption.

PRODUCTION AND/OR SLAUGHTER DATA ON YEARLING AND OLDER CATTLE NOT INCLUDED IN BREEDING HERDS IN 1950.

Virginia Station

Line or group designation	High	Low	Hereford	Angus
Location	Blacksburg	Blacksburg	Blacksburg	Middleburg
Breeding	Grade Hereford	Grade Hereford	Pure breed Hereford	Pure breed Angus
Sex	Female	Female	Female	Female
No.	7	9	24	59
Av. age (fall 1949)	194	224	235	275
Av. wt. (fall 1949)	396	456	472	480[7]
Av. winter gain	69	89	74	170[7]
Days on pasture[6]	161	161	161	182
Av. gain on pasture	249	253	182	146
Av. wt. adjusted to 18 months of age	709	723	640	660[7]
Feeder grade 6 months	12.5	12.0	11.4	11.4
Feeder grade 18 months	10.0	10.3	11.0	10.2
Av. slaughter grade	6.9	7.9	7.4	8.0

[6] The pasture period considered here is from May 1 to October 9, at Blacksburg, and from April 26 to October 25, at Middleburg. Actually, the grazing period in Virginia extends to late November or early December, but the year is ended about the middle of October when calves are weaned and fat cattle are sold. Gains in the fall after termination of the year are included with winter gains.

Pasture furnished the sole feed for these heifers during the grazing period.

[7] These are rough approximations based on available information. Scales were not installed at the Middleburg Station until February 17. The gain from February 17 to April 26 was 88 pounds per animal. The average fall weight and the average winter gain was approximated from this figure. Likewise, the average adjusted weight at 18 months of age is also an approximation.

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Meeting of Executive Committee of Southern Regional Beef Cattle Breeding Project
Project S-10
Waco, Texas

MINUTES
April 16, 1950

The Executive Committee of the Southern Regional Beef Cattle Breeding Project (S-10) met in the hotel at Waco, Texas at 10:45 p.m.

Chairman Chas. S. Hobbs called the meeting to order. The following members were present:

E. J. Warwick	H. A. Stewart
R. T. Clark	B. L. Warwick
C. S. Hobbs	R. E. Patterson

After some discussion of the organization of the committee, Stewart suggested that the duties and responsibilities of the Technical and Executive committee members and the Regional Advisor be defined and read before the Technical committee at the next regular meeting. Dr. Clark informed the committee that he would assemble this information.

Patterson reported on the budget suggested by Advisor Lewis at the meeting of Directors of Land Grant Colleges in Kansas City in October 1949.

The amounts proposed were:

No increment	50% increment	100% increment
$ 29,000	$ 60,000	$80,000

The Directors suggested for 1950-51:

No increment	20% 30 25,900	50% 40 000	100% 40,000
$29,000	$30,500	$35,700	$40,600

Patterson, reporting on the current status in Congress on R-M funds, indicated that no increase in funds is probable. No decrease is probable since the House Committee on Budget has recommended no reduction.

Dr. Clark asked for an explanation for the delay to the next fiscal year of the $1,000 allocated to Maryland through action of the Committee at Biloxi, Miss. in February.

Patterson explained that Dr. Fromme proposed that this fund be carried over into the next year, due to the pressure of time and the details involved in making the funds available to Maryland, the funds would be transferred to that state next year.

The allocation to Maryland is to come from the carryover of 1949-50 funds.

Motion by Stewart, seconded by B. L. Warwick that the general distribution of funds as established by the Technical Committee at Miles City be followed, with an adjustment of $700 made necessary to allocate all probable funds. Motion carried.

Hobbs suggested that the Technical Committee set the total amount of funds requested for the project in the regular meeting in the summer of 1950. A second committee meeting is to be held at the time of the meeting of Southern Agricultural Workers to allocate funds by states. No action was taken on these suggestions.

This proposal shall be presented for discussion at the next regular Technical Committee meeting.

During discussion of organization it was pointed out that the following states in this region have Beef Cattle projects approved in the O.E.S.

Tennessee	North Carolina	Florida
Texas	South Carolina	Georgia
Arkansas	Virginia	Maryland

Louisiana

The committee asked Dr. Patterson to obtain a clarification of the statement in the letter of 3-27-'50 from Dr. Fromme to Director Lewis, and to report this to the Technical Committee in the next regular meeting.

Consideration is to be given to a restatement of the project.

During the course of discussion of committee procedure it was determined that the responsibility for requesting state reports rests with the Chairman of the Technical Committee. The Coordinator will assemble and edit these reports.

The Administrative Advisor submits the compiled report to the Committee of nine and to the directors after it has been signed by the Chairman and Advisor.

The Administrative Advisor, at the suggestion of the Chairman of the Technical Committee authorizes all meetings. Official meetings are those for which travel expenses of Committee members are to be paid from Regional 9b3 funds.

The Chairman of the Technical Committee shall call all meetings. He advises Dr. Fromme and the members of the Technical Committee as well as all directors, quoting from the directive from the Regional Advisor.

Motion by Stewart, seconded by Warwick, that the next regular Technical Committee meeting be held at State College, Mississippi July 14 and 15. Motion carried.

Reports to be requested at regular meeting from:

Committee on rations
Committee on selection indexes

With no further business, meeting declared adjourned.

H. A. Stewart

H. A. Stewart, Secretary

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MINUTES, S-10 TECHNICAL COMMITTEE MEETING
FRONT ROYAL, VIRGINIA
October 15, 1951

Those in attendance at the annual meeting of the Technical Committee of S-10 Beef Cattle Breeding held at Front Royal, Virginia, October 15, 16 and 17, 1951.

Technical committee members:

Keith E. Gregory	Alabama	T. B. Patterson	Mississippi
Warren Gifford	Arkansas	H. A. Stewart	North Carolina
W. G. Kirk	Florida	Chas. S. Hobbs	Tennessee
B. L. Southwell	Georgia	Bruce L. Warwick	Texas
R. M. Crown	Louisiana	C. M. Kincaid	Virginia
W. W. Green	Maryland		

R. E. Patterson	Regional Advisor S-10
E. J. Warwick	Regional Coordinator S-10
R. T. Clark	National Coordinator, Beef Cattle Breeding
Thomas H. Bartilson	Asst. Chief, AHD, BAI, Beltsville
T. C. Byerly	Chief, AHD, BAI, Beltsville
Hugh C. McPhee	BAI
H. W. Marston	Agricultural Research Administration
E. C. Elting	Office of Experiment Stations

Guests:

J. C. Pierce, Jr.	Livestock Branch PMA
Ed. P. Warren	University of Georgia
C. J. Brown	Arkansas Agri. Exp. Sta.
H. J. Smith	Tennessee Agri. Exp. Sta.
Marvin Koger	University of Florida
T N. Blumer	North Carolina Agri. Exp. Sta.
R. C. Carter	Virginia Agri. Exp. Eta.
Richard A. Damon,Jr.	Louisiana Agri. Exp. Sta.
E. H. Vernon	Jeanerette Station LA-BAI
William Jackson	Brocksville Station Fla-BAI
H. H. Brugman	Maine Agri. Exp. Sta.
Bob Priode	Front Royal Station, Va.
A. L. Baker	Front Royal Station, Va.
Ray C. Hammes	Middleburg Station, Va.
Hayden M. Weaver	Middleburg Station, Va.
Frank A. McClaugherty	Front Royal Station, Va.
Dr. L. C. Purmell	Veterinarian Front Royal BAI
E. W. McComas	AHI BAI Beltsville
W. M. Dawson	AHD BAI Beltsville
R. G. Schott	AHD BAI Beltsville
Wm. J. Krebs	AHD BAI Beltsville
Ray Dankenbring	Farm Journal
Claude Gifford	Farm Journal
Robert McMillan	Farm Journal
Jim Birchfield	Washington Evening Star

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The first session of the annual meeting of the S-10 Technical Committee was called to order by Chairman Kincaid in the assembly room of the Administration Building on the Front Royal Station at 8:30 a.m. October 15, 1951.

Roll was taken. Committee members and guests were introduced.

The following committee appointments were made:

Committee on Methods of Feeding and Management

W. W. Green	Maryland	Chairman	K. E. Gregory	Alabama
W. G. Kirk	Florida		T. B. Patterson	Mississippi

The Chairman asked this committee to study the grain/roughage ratios being used in the testing programs of the region and to strive toward recommendations leading toward greater uniformity of this ratio in rations fed to animals on test. He also asked that emphasis be pointed toward the testing of animals on pasture.

The former committee on Methods of Measurement was divided into two sub-committees; one on live animal evaluation and one on carcass appraisal.

Sub-committee on Live Animal Evaluation

B. L. Southwell	Georgia	Chairman	E. G. Godbey	South Carolina
Warren Gifford	Arkansas		C. M. Kincaid	Virginia

This committee was asked to strive toward the use of common animal grade scores at all stations.

Sub-committee on Carcass Appraisal

C. S. Hobbs	Tennessee	Chairman	H. A. Stewart	North Carolina
B. L. Warwick	Texas		R. M. Crown	Louisiana

This committee was asked to consider methods of evaluating and measuring carcasses as may be done in a meats laboratory and as it may be done in a packer cooler.

The Chairman requested each Technical Committeeman to make an estimate of his total expenses for attendance at this meeting and to hand this estimate to Regional Advisor today.

The meeting was then adjourned to the barn where all attending were given an opportunity to give estimates of the slaughter grades on 26 cattle of varying ages and previous feeding and management.

Mr. John C. Pierce, Jr. representing the Livestock Branch of PMA of the USDA served as offical grader. He discussed the factors affecting the grading of each animal.

After the grading work at the barn was completed the group reconvened in the assembly room. Here Mr. H. W. Marston gave a short history of the Front Royal Station. He pointed out some of the details of the change over from an Army Remount station to beef cattle work.

Adjournment was declared to allow an opportunity to those present to visit the Angus feeder calf sale being held in Front Royal.

The group ate lunch together at the Skyline Restaurant.

The afternoon session was opened with the report on the work carried on by the Virginia Agricultural Experiment Station. All beef cattle work at Front Royal, Middleburg, and Blacksburg contribute to the S-10 project.

Three breeds are maintained at Front Royal. 55 to 60 Angus cows are owned by the station. The 100 Hereford cows now at Front Royal are on a share agreement with breeders and the 25 purebred Hereford females were brought from the herd at Blacksburg. During the report Dr. Kincaid mentioned that the Shorthorn herd originating from Beltsville dropped a calf crop of 72% in 1950 and of 64% in 1951. Dr. Hobbs raised the question about whether this line should be continued.

Continuation appears to be justified at present.

At Middleburg

Using 59 Angus cows, a study is being made of half sib groups of 6 or more. The half sib groups of females are randomly divided equally between 2 bulls to find evidence of nicking ability.

Calves are dropped in the fall. The first calves are now on the ground.

At Blacksburg

Estimates of the heritability of rate of gain have been made from the comparison of the rate of gain of progeny of high and low performing bulls from the bull feeding tests. A herd of grade Hereford cows is maintained for this work.

R. C. Carter gave a report on the bull feeding work being conducted at Front Royal. A mimeographed summary of this work for the past year was passed.

A. L. Baker, superintendent of the Front Royal Station, gave the vital statistics of the area.

As of June 30, 1951 there were 576 head of cattle on the station, 239 of which are owned by the state of Virginia. The total cattle numbers were made up of 127 Angus, 243 Herefords and 206 Shorthorns. The total area in the Front Royal Station is 4118 acres of which 1892 acres are now in pasture. He indicated that present numbers were considered sufficient to completely stock the area.

A very complete written report of this station was handed to the members of the executive committee.

Adjournment to look over groups of cattle and layout of the Front Royal Station.

COMMITTEE REPORTS

Report of the Committee on Feeding and Management

Recommendations:

1. That, if possible, a project or projects be established to study the importance of genetic-environmental interactions. One specific suggestion would be the use of identical twins to study the problem of the rate and economy of gains made under dry-lot and pasture conditions.

2. A committee be asked to work on procedures and methods for the reduction of rations to a common denominator for reporting the results of feeding trials.

3. Each station should be encouraged to study the report of the joint committee of the American Society of Agronomy, Dairy Science, and American Society of Animal Production on pasture research technics and the evaluation of pastures.

4. That in light of recent work, a feeding period of 150 days be accepted as satisfactory.

5. Investigations be made to study the advisability of increasing the roughage to grain ratio.

6. All stations should follow the recommended nutrient allowances suggested by the National Research Council.

7. That a standing committee be established to study various phases of nutritional problems as related to this project.

Respectfully submitted,

K. E. Gregory
W. G. Kirk
T. B. Patterson
W. W. Green, Chairman

Report of Sub Committee on Carcass Evaluation

1. A tentative list of measures was suggested for all gathering any carcass data.

    1. Slaughter grade
    2. Carcass grade
    3. Live weight
    4. Cold dressed weight (Calculated from hot weight)
    5. Length of carcass (Hock to front of first rib)
    6. Length of leg (Aitch bone to point of hock)
    7. Thickness of fat (3 measures - BAI)
    8. If possible - Area rib eye (Cut between 12th and 13th rib following 12th)

II. Those with facilities for processing carcasses are encouraged to make break-down studies following the method of Hankins in the determination of the true cut out values of animals. (Should the recommendations of the Beef Cattle Evaluation Committee of the Fourth Annual Reciprocal Meat Conference be adopted by that body, their recommendations should be followed.)

III. Suggested major problems for study.

Appraisal of quality: Color, Marbling, Finish.
Differences in the true market cut out value of steers of same market grade.
A study of twins, trios, or quartets, of half sibs under different management systems to constant weight and/or finish.
Analysis of existing data correlating measures on live animal with carcass values.

IV. It is recommended that:

1. At least one half day be devoted to carcass evaluation in our meeting in 1952.
2. The next annual meeting be held the first part of September 1952.

B. L. Warwick
H. A. Stewart
R. M. Crown
T. N. Blumer
C. S. Hobbs, Chairman

Report of Sub-Committee on Live Animal Evaluation

After a discussion of the various methods and measurements used by the various participating states in S-10, no one system of measurement, or index, was agreed upon to work toward. An ultimate goal is a common index.

Until a common index and common methods of expressing weights, measurements of body, and type are adopted, it is recommended that all stations convert their results to a common denominator with references to means, variances, etc. for annual reports and summaries, when possible.

It is proposed that the committee obtain a copy of each system of records or evaluations used by each state for study and possible distribution to each member of the Technical Committee.

It is suggested that special information be obtained to determine if "condition" ratings are being recorded at the time type ratings are being made on breeding animals.

Report made by Warren Gifford
B. L. Southwell, Chairman

EXPERIMENTAL BEEF SLAUGHTER RECORD

Date and time of slaughter _____

Identification _____ Wt-End of Feeding _____ (lbs) Time taken off feed

Sex - - - - - _____ Live Wt. at slaughter _____ (lbs) _____

Holding time (Hrs) _____

Breed - - - - _____ Holding shrink _____ (lbs.)

Age (if known) _____ Holding shrink _____ (%)

Live Grade _____ Price _____ Cost _____

				Value
Blood _____	(lbs.)	Liver _____	lbs.	_____
Head _____	(lbs.)	Heart _____	"	_____
Hide _____	(lbs.)	Tongue _____	"	_____
Wt.(lbs) Length (inch)				
Frontshanks & feet _____	(lbs.)	Sweetbreads _____	"	_____
Rearshanks & feet _____	(lbs.)	Cheek Meat _____	"	_____
Caul Fat _____	(lbs.)	Tail _____	"	_____

Ruffle Fat _____ (lbs.) Carcass Number _____

Paunch Weights _____ (lbs.) Hot Carcass Weight _____ (lbs.)

Empty weights _____ (lbs.) Chilled carcass weight (24 hrs.)

Intestine Weights _____(lbs.) _____ (lbs.)

Empty Weight _____ (lbs.) Chilled Carcass weight (48 hrs.)

Totals _____ (lbs.) _____ (lbs.)

Contents _____ (lbs.) Shrink _____(lbs.) _____ (%)

Plunk _____ Dressing Percentage _____

Bladder _____ Carcass Grade _____

Empty " _____ Color Fat _____

Wt. of Urine _____ Carcass cost _____

Miscellaneous _____

_____

_____

Comments

MINUTES BUSINESS MEETING S-10
October 17, 1951

The regular annual business meeting of the S-10 Technical Committee was called to order by Chairman C. M. Kincaid at 8:40 a.m. October 17, 1951. Minutes of previous meeting and of the Executive Committee Meeting at Denver had been distributed earlier, so were not read. Consideration was given to the revision of the original project outline as submitted to the whole committee by the Executive Committee at the first session of the conference.

Hobbs of Tennessee moved that revised project outline be accepted with the following provisions:

1. Include the editorial changes suggested by W. W. Green.
2. Such additions as may be required by Outline of Procedures Form 1038 shall be included.
3. The outline shall be checked for adequacy and form by the regional advisor, Dr. Patterson, with Dr. Elting of O.E.S.
4. Changes suggested by any state may be incorporated after their approval by the Executive Committee.

Seconded by Gifford. Motion passed.

During the discussion of the minutes of the Denver meeting of the Executive Committee, Dr. Patterson explained that the purpose of the visit to the Bureau stations in the Southern region was for unbiased appraisal of the work of the stations as they contribute to the regional effort and for that reason representatives of the Bureau other than our Regional Coordinator were not invited.

Motion by Hobbs that the minutes of the 1950 meeting and the interim meeting held at Denver be approved.

Seconded by Green. Motion passed.

The chairman called for any corrections in the mimeographed list of animal numbers and expenditures to June 30, 1951 as listed by the regional coordinator. None were made.

Dr. Patterson spoke on the problems and attitudes of station directors in setting up regional funds. He mentioned that southern directors indicated greater support of the regional effort in S-10 through 9b 3 funds on the basis of their own proposed apportionment within the individual states than is now received. He pointed out the difficulties in changing funds that have been allotted to projects, and the personnel working in them.

The history of the development of the S-10 project was reviewed to indicate the way the present allocations of 9b3 funds were made. He mentioned the duties and responsibilities of the Technical Committee in relation to the projects proposed to be included in the regional effort and pointed out the purposes and functions of the Executive Committee. Dr. Patterson said that he considered

the reviews of the Texas station, the Louisiana station, and the Jeanerette, Brooksville and Front Royal stations by the Executive Committee were a contribution to the project. He mentioned that it is encouraging to note that the Directors of Southern Regions have budgeted 9b3 funds for the 1952-53 fiscal year as follows:

No increased increment	$29,000
50% increase	50,000
100% increase	80,000

This is more liberal on the 50% and 100% increments than heretofore.

All funds must be spent out to the dollar by June 30, 1952, particularly those funds assigned to travel.

Stewart read a letter from Dr. S. H. Work regarding possible introduction of Kouprey from French Indo-China into the National Zoo. This may offer an opportuhity for further wide crossing studies.

Dr. McPhee mentioned that zoo managers were to hold a meeting in Miami soon to discuss animal introduction with the Bureau of Animal Industry.

Chairman Kincaid led the discussion of the distribution of 9b3 funds.

Gifford suggested that the travel portions of the 9b3 allotment could not be discussed until the location of the 1952 annual meeting had been decided.

Hobbs moved that the 1952 meeting be held in Knoxville in early September. Seconded by Southwell. Motion passed.

Dr. Patterson suggested that the Executive Committee estimate the travel costs for the meeting at Knoxville. So moved by Green, seconded by Gifford. Motion passed.

Dr. Patterson suggested that the estimate should include travel funds for a meeting of the Executive Committee if such a meeting is necessary.

Chairman Kincaid called for recommendations for the allocation of 9b3 funds for 1953.

Green asked if allocations could be shifted from states now receiving them to states now needing them.

Kincaid gave the position of Virginia on the question.

Gregory mentioned that states not now receiving 9b3 funds are handicapped if allocations remain as they are now. He indicated that the Alabama work proposed for pilot studies with small animals would contribute greatly to the regional effort.

Southwell suggested that the Executive Committee look into projects now receiving funds to see if work now underway in those states is more worthwhile than new projects now proposed. He moved that the recommendation of Executive Committee be followed, i.e., that present funds remain as is. Seconded Green. Passed.

Hobbs mentioned that Dr. S. H. Work has left the Office of Experiment Stations for other work. He praised thoughtful guidance of Dr. Work from the initiation of the project through the meeting of the Executive Committee in Denver in May. Hobbs moved that the Chairman write a letter of appreciation for the time, the effort and the consideration given to the S-10 project to Dr. Work, and also a letter of commendation for the work of Dr. Work to Dr. Elting, Associate Chief of O.E.S.

Seconded by Kirk. Motion passed.

Hobbs moved that the chairman write a letter to Drs. Sims, McPhee and Byerly expressing the feeling of the Technical Committee that the maintenance of the personnel of the coordinating offices is essential to the well being of the project, both in the region and nationally.

Green amended motion to make it resolution.

During discussion Stewart mentioned that the services of our coordinator are now impaired by the fact that he has no clerical or secretarial help except that given by the University of Tennessee. The coordinator of the Western Region has resigned and there is no clerical help in that region at present. Our National coordinator is considering a trip to the Hawaii station to relieve the financial pressure on the project. These facts justify the resolution.

Motion as amended passed.

Dr. R. E. Patterson mentioned the request he had received from the State of Maine asking that they be included as a cooperating state in the S-10 project. He charged the Executive Committee to give him some recommendation on the position of Maine in this region to be presented at the meeting of station directors.

Hobbs moved that the secretary write letters of appreciation to those responsible for the hospitality shown at the Front Royal meeting. Seconded by Gifford. Motion passed.

Moved by Gifford. Seconded by Green that the Executive Committee be empowered to act on the inclusion of Maine in the region after a review of their project statement and other pertinent information.

Motion was passed.

Election of officers. Ballots were passed for voting with no nominations. Nominees were elected by a majority of votes. Stewart elected Chairman, Southwell secretary, and Hobbs Executive Committeeman at large.

On behalf of the Technical Committee, Hobbs expressed appreciation to Stewart for bringing the Brahman steers from Raleigh to the meeting.

Adjourned.

H. A. Stewart, Secretary

Program of Technical Committee Meeting
S-10 Beef Cattle Breeding Project
Front Royal, Virginia

October 15, 16, 17, 1951
C. M. Kincaid - Chairman

Oct. 15	8:00	Registration
	8:30	Roll Call - C. M. Kincaid Committee assignments
	9:00	Inspect live animals to be slaughtered for later inspection as carcasses to clarify beef cattle grading system - - - - - - - - - - - - - J.C.Pierce, Jr.
	11:00	History of Front Royal and the development of the Beef Cattle Station - - - - - - - - - - - - - - H.W. Marston
	1:00	Discussion of Research Program and Inspection of the Station.
	7:00	Meetings of committees at Hotel Royal

Feed and management W. W. Green, Chm.
Animal evaluation and measurements
Live Animal B.L. Southwell, Chm. Subcom.
Carcass evaluation C.S. Hobbs, Chm. Subcom.

Oct. 16	8:00	Reports of committees
	10:00	Reports of work by states
	1:00	Reports by states - continued
	3:15	Beef Cattle Breeding work in the Southern Region - E.J. Warwick
	3:45	The Beef Cattle Breeding Program from the National Viewpoint - - - - - - - - - - - - - - - R.T. Clark
	5:30	Barbecue - - - - - - - - - - - - - - - H.W. Marston, in charge
	7:00	Current Breeding Problems - - - - - - - - - - -Dr. M.T. Jenkins, Bureau of Plant Industry
Oct. 17	8:00	Business meeting

Recommended allocation of 9b3 funds

Election of officers

	10:30	Enroute to Shen-Valley Packers, Timberville, Virginia
	1:00	Inspection of carcasses and grades of cattle observed alive on October 15, with comments by Mr. J. C. Pierce.

Further discussion of grading system
Adjournment

MEETING OF EXECUTIVE COMMITTEE
of
SOUTHERN REGIONAL BEEF CATTLE BREEDING PROJECT

Project S-10
Denver, Colorado
May 30, 1951

The Executive Committee of the Technical Committee of S-10 RMA Beef Cattle Breeding Project met at the coffee shop of the Albany Hotel, Denver at 7:00 A.M. May 30, 1951. Dr. C. M. Kincaid presided. Those present were:

C. M. Kincaid	E. J. Warwick
C. S. Hobbs	R. E. Patterson
H. A. Stewart	H. W. Marston

(A tentative program for the fall meeting of the Technical Committee of the S-10 project had been outlined in a brief meeting of the Executive Committee at breakfast on May 28. At that time the tentative dates suggested for this meeting were October 15, 16 and 17.)

Tentative dates of October 15, 16, 17 at Front Royal, Virginia, were confirmed for the meeting of the S-10 Technical Committee. Corrections and suggestions were made from the committee as a whole on the revision of the S-10 project. Further revision to be made by committee members before putting into final form for approval of the Technical Committee meeting in October.

After some discussion it was agreed that funds be requested as they were last year with allocations to states to be made after the Technical Committee meeting at Front Royal.

Dr. Patterson expressed the opinion that 9b3 funds should be put with few stations rather than to be spread over all states in the region. He further stated that he would not recommend the division of these funds among all states, but rather to specific states engaged in a particular service for the region.

Dr. Hobbs moved that an Executive Committee meeting should be held Sunday, October 14, at 4 P.M. the day preceding the meeting of the Technical Committee. Seconded by Stewart. Motion carried.

Motion by Dr. Hobbs that states now receiving 9b3 funds make a summary of work that has been done with these funds together with proposals of work projected. States not now receiving these funds but who wish to participate should outline work they would propose to do with such funds. Seconded by Patterson. Motion carried.

It was suggested that a committee from the Southern Region visit the Bureau stations in the region with a view of bringing work in these stations into closer coordination with regional work.

This was made into a motion by Stewart seconded by Hobbs. Motion carried.

Adjournment.

Respectfully,

H. A. Stewart
Secretary, S-10 Project

(Copy)

VIRGINIA AGRICULTURAL EXPERIMENT STATION

Blacksburg, Virginia

October 24, 1951

Dr. S. H. Work
c/o Office of Experiment Stations
Washington 25, D. C.

Dear Dr. Work:

At the recent meeting of the S-10 Technical Committee I was instructed, as chairman of that committee, to write you a letter expressing our appreciation for your assistance in the initiation, organization, and development of the Southern Regional Beef Cattle Breeding Project.

Your thoughtful guidance in the preparation of the project outline and in the development of the program has been most helpful. Ideas regarding needed research and methods of approach to problems advanced by you in our discussions were distinct contributions to the program. We realize that your interest and support went far beyond your actual duties in connection with the Beef Cattle Breeding Project of the Southern Region.

The whole committee joins me in wishing you every success in your new work.

Sincerely yours,

C. M. Kincaid, Chairman
S-10 Technical Committee

CMK/ef
cc to: R. E. Patterson
H. A. Stewart
C. S. Hobbs
E. J. Warwick
E. V. Elting

(Copy)

VIRGINIA AGRICULTURAL EXPERIMENT STATION

Blacksburg, Virginia

October 24, 1951

Dr. E. V. Elting, Assoc, Chief.
U. S. Department of Agriculture
Office of Experiment Stations
Washington 25, D. C.

Dear Dr. Elting:

Enclosed is a copy of my letter as Chairman of the S-10 Technical Committee to Dr. S. H. Work expressing the appreciation of the committee for his assistance in the initiation, organization, and development of the Southern Regional Beef Cattle Project. It was the opinion of the Technical Committee that Dr. Work should receive special recognition and commendation for his contributions to our program.

I was also instructed to express our appreciation for your participation in the meeting at Front Royal. Your contributions to the program were most helpful. The letter to Dr. Work, as well as this letter, recognizes on the part of the S-10 Technical Committee the importance to the Beef Cattle Breeding Program of participation and support by the Office of Experiment Stations. It was the feeling of the Technical Committee that the Office of Experiment Stations is an important factor in tying the Regional Breeding program together.

The motion instructing me to write letters to Dr. Work and to you contained the following statement, and I quote: "The scope and importance of meat animal work with its unique problems, together with the need for increased meat production to feed our people in these critical times, points to the need for an Animal Husbandman on the staff of the Office of Experiment Stations to replace Dr. Work".

Sincerely yours,

C. M. Kincaid, Chairman
S-10 Technical Committee

CMK/ef
Enclosure
cc to: R. E. Patterson C. S. Hobbs
H. A. Stewart E. J. Warwick

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